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Swine — Cost of prod.

Cost of Producing Feeder Pigs in South Central Missouri

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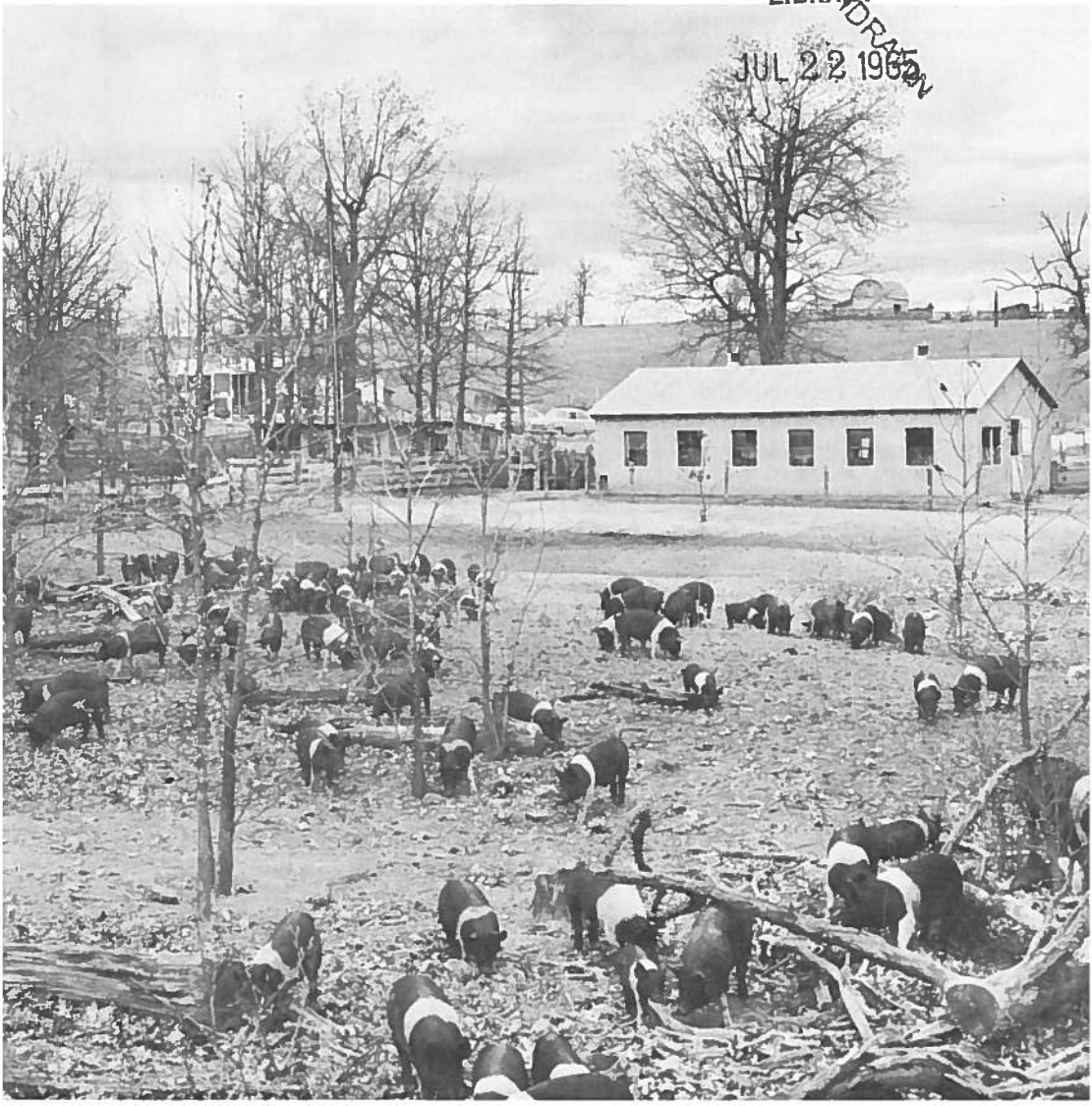

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CONTENTS

Procedures 3
Design of Study 3
Time Period Involved 4
Measures of Income and Efficiency 4
Other Terms Used 4
General Data on Farms in Study 5
Results 7
Average Data on Farms Studied 7
Composition of Production Cost 8
Labor, Machinery and Equipment 9
Buildings; Pasture; Interest on Hog Investment; Feed Cost; Hog Purchases; Marketing Costs 10
Other Costs 11
Comparison of Size of Enterprise to Costs and Returns 11
Differences Between High, Medium, and Low Income Producers 15
Influence of Pigs Raised per Litter 17
Influence of Feed Efficiency 18
Appendix A—Statistical Analysis 20
Appendix B—Methods and Assumptions Used in Calculating Costs and Returns 24

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Cost of Producing Feeder Pigs *in South Central Missouri*

ALLAN J. BOESCH AND FRED E. JUSTUS, JR.

Feeder pig production is a rapidly expanding enterprise on many farms in the Missouri Ozarks. Some factors responsible for this include a favorable climate, rolling land which can be best utilized as pasture, close proximity to the corn belt and large feeding operations, and the need to have an enterprise which will utilize farm labor and provide a sufficient volume of business.

Extension Service personnel have been working closely with many feeder pig producers in the area. Their efforts have been hampered, however, by the lack of economic data on feeder pig production. Extension personnel in the area expressed the need for, and willingness to participate in, a comprehensive study of the costs and returns of producing feeder pigs. Consequently, a two year study was initiated. Results of the first year of the study are presented in this report.

The specific objectives of the study are:

(1) To determine physical input-output relationships and costs and returns of feeder pig production in South-Central Missouri.

(2) To determine the extent to which factors such as size of enterprise and level of technology influence the physical and monetary input-output relationships in the production of feeder pigs.

(3) To determine the implications of feeder pig production to the farms in the area.

PROCEDURES

Design of Study

The study is a cooperative effort involving personnel of the University Extension Service in the study area and the Department of Agricultural Economics, University of Missouri. A detailed enterprise record system was developed in the

Department of Agricultural Economics. Extension Service personnel in six counties obtained the cooperation of feeder pig producers in keeping the records and supervised the record-keeping.* The records were then summarized and analyzed in the Department of Agricultural Economics.

Time Period Involved

The study was initiated in the summer of 1962. The data presented herein are for the year August 1, 1962—July 31, 1963. Farmers are currently keeping records for the second year of the study.

Measures of Income and Efficiency

Two different measures of net income are presented: (1) Net Returns to Labor and Management, and (2) Net Returns to Management. The first measure is the income remaining after all costs except labor and management are charged. Net Returns to Management is that income remaining after all costs except management are charged. In determining this measure labor used is charged at $1.00 per hour.

Though Net Returns to Management more nearly shows true profit from the feeder pig enterprise, Net Returns to Labor and Management is emphasized in this publication because it more clearly indicates the income to the farmers involved for their efforts—their labor and management. Large variations occurred in labor used on these enterprises because of differences in methods of handling the hogs, in equipment they used, distance to pasture, and amounts of "attention" and care given. Considering these variations and possible differences in the accuracy of the labor data, Net Returns to Labor and Management is preferred by the researchers.

One measure of over-all enterprise efficiency is stressed in this study—Returns Per $100 Charged for Land, Labor, and Capital. It shows the relationship between total gross income and total costs of production (including labor at $1.00 per hour). If this figure is under $100, not all inputs used in the business have been rewarded as they should have been.

Other Terms Used

Total Weight of Pork Produced—The total pounds of live weight of swine actually produced on the farm during the year records were kept. The amount of pork produced was determined by adding together the weight of hogs (pigs and breeding stock and other hogs) sold, weight of hogs in ending inventory and weight of hogs used by the family. From this total was subtracted the sum of the weight of hogs purchased and weight of hogs in the beginning inventory.

Gross Receipts—The total cash receipts for hogs sold before marketing charges (commission, transportation, etc.) were deducted.

Farmer's Receipts—The total cash receipts that the farmer actually received. Marketing charges were deducted.

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* Dent, Douglas, LaClede, Maries, Oregon and Texas Counties were involved during the first year of the study.

Total Gross Income—The total of farmer's receipts, any miscellaneous cash receipts, home use produce, and an adjustment for a difference in the value of hogs on the farm at the beginning and ending inventories.

Average Number of Sows—The average number of sows and gilts on the farm during the record period. This measure was calculated by adding up the number of sows and gilts listed in each of the monthly inventories and then dividing by 12. Some adjustments were made in case of young gilts.

Percent of Farrowing Potential—The relationship between the number of litters of pigs farrowed on a farm and the number of litters which could have been farrowed in a year with the sows and gilts the farmer had (assuming 2 litters per year per sow).

7. *Percent of Farrowed Pigs Raised*—The number of feeder pigs raised divided by the number of pigs farrowed times 100; a measure of death loss of farrowed pigs.

8. *Gross Returns Per $100 Feed Fed*—A very useful livestock efficiency measure. It represents the relationship between gross income and value of feed used. It is *not* a feed efficiency measure per se—the figure shows *overall* efficiency. Any figure over $100 is what was left to pay for expenses other than feed.

GENERAL DATA ON FARMS IN STUDY

Detailed records of 45 feeder pig producers were collected and summarized. All data presented in this report, however, are from 38 farms; seven records were discarded because of inadequacies in the data.

Records were kept on 1,429 litters. The feeder pig enterprises on individual farms ranged from five to 210 litters, with an average of 37.6 litters per farm.

As stated earlier, large scale feeder pig production is a relatively new enterprise in the area. Of the 38 producers studied, 33 produced feeder pigs in 1961 and only 21 produced feeder pigs in 1958. In terms of numbers of litters, there were 790 litters produced in 1961 on these farms and only 408 in 1958 (compared with 1,429 in 1962-63).

Twenty-five of the producers indicated they were expanding their feeder pig enterprises, 11 were maintaining their present size of operation, one was in his first year of operation, and one was going out of business. The most significant change was evident in the group having 61 litters or more; five of these six producers were expanding their feeder pig operation at the time the records were being kept.

Eighteen of the cooperators worked off the farm a major portion of the time; 11 had virtually full time off-farm jobs. On 19 of the 38 farms, feeder pig production was not the major livestock enterprise—that is, another enterprise, usually dairy, used a greater amount of the farm livestock labor.

Thirty-five of the producers sold all or part of their feeder pigs through either an organized feeder pig sale or through an auction market. Of these, 30 indicated that they used an organized feeder pig sale during the record year. Only 3 producers sold all of their feeder pigs to individual farmers or truckers, but another 8 producers marketed some of their pigs this way.

Thirty-three farmers had permanent farrowing houses, although usually these were converted old barns or buildings. Twenty-six farmers indicated use of farrowing stalls or crates. Twenty farmers gave pigs iron shots, 34 vaccinated for cholera and 35 vaccinated for Erysipelas. Twenty-six farmers kept weaned pigs on pasture, nine kept them in confinement, and three sold all pigs directly off the sow. Only two kept sows in confinement and seven kept boars in confinement. Thirty-one purchased all feed fed—the rest purchased some feed, other than protein supplement and minerals. Only three farmers indicated they ground and mixed a major portion of the feed on the farm.

RESULTS

Average Data on Farms Studied

Costs and returns were computed on the basis of data provided in the detailed enterprise records. Specific methods and assumptions used in the calculations are presented in Appendix B.

It cost the farmers in this study an average of $110.09 per litter to produce feeder pigs. The range in cost per litter was from $42.50 to $198.30.

Total cost per cwt. of pork produced averaged $21.26. The range on individual farms was from $14.30 to $36.40. Care needs to be exercised in using cost and returns data on the per cwt. of pork basis. Per cwt. figures are very useful in studies of slaughter hog production but they can be misleading in studies of feeder pig production. Per cwt. costs and returns are usually considerably higher for feeder pig production than for slaughter hog production, thus the reader must resist the temptation to compare these directly with the current market price of slaughter hogs. Moreover, the per cwt. costs and returns would naturally vary with the weight at which the producer sells his pigs. Per litter data are more meaningful for studies of feeder pig production.

A large difference existed between the high cost and low cost producers in this study. Although some variation would always be expected, these data clearly point out that feeder pig producers must study carefully the many parts of the production process if they are to compete successfully in the future.

Many factors influence the cost of production. Knowing what the factors are and how to correct them is of prime importance to the producer. In the section on costs a number of factors will be discussed. Some of the factors can be changed readily, whereas others can not.

The average weight of pork produced per litter on these farms was 536 pounds. On individual farms the weight per litter varied from 253 pounds to 933 pounds. Sale weight of pigs and number of pigs per litter are the two components which determine the total weight per litter. The average weight per feeder pig sold varied on individual farms from 36 to 101 pounds.

Average price received per cwt. of pork was $24.71: the range in average price per cwt. received by individual farmers was from $19.52 to $29.92, with the variation in the sale weight of pigs responsible for much of this price range. Pricewise, the time period included in the records is considered to have been favorable for feeder pig producers.

Net returns to labor and management averaged $27.51 per litter on these farms with a range on individual farms from -$2.73 to $61.45. On a per cwt. basis, the average was $5.33 with a range between the low and high individual of -$.54 and $12.79, respectively.

Net returns to management averaged $10.60 per litter on these farms with a range from -$78.51 to $53.71. On a per cwt. basis the average was $2.28 with a range from a low of -$6.82 to a high of $11.33.

Returns per $100 charged for land, labor, and capital varied widely. The average was $113.62 and the range was from $57.20 to $178.75. Producers having less than $100 in this measure did not break even, if their labor was worth $1.00 per hour.

COMPOSITION OF PRODUCTION COST

A breakdown of the various production costs per litter is presented in the "all farms" column of Table 1. The costs are divided into two basic classes: (1) fixed costs and (2) direct costs. The direct costs are easily recognized by the producer as costs. The fixed costs are often overlooked by producers as they may not involve cash outlays, and may involve items used by more than one enterprise. Fixed costs often are not easy to determine, but producers must be aware of their importance. The fixed costs on the farms studied varied a great deal, depending primarily upon the buildings and equipment used, and the amount and kind of pasture. They are separated from direct costs in this report so that a producer applying these data can use his own fixed cost situation.

Table 1. Relationships of Number of Litters of Feeder Pigs to Per Litter Costs and Returns

ITEMS	ALL FARMS	SIZE CATEGORIES (LITTERS) 5-20	21-40	41-60	61-OVER
Number of Farms	38	12	13	6	7
RETURNS PER LITTER:					
Gross Receipts	$114.43	$133.19	$107.26	$122.02	$112.00
Marketing Charges	2.96	4.36	2.65	3.51	2.52
Farmer's Receipts	111.47	128.83	104.61	118.51	109.48
Miscellaneous Receipts	.59	.75	.37	.46	.21
Change in Hog Inventory	8.63	-5.00	2.19	11.93	20.69
TOTAL GROSS INCOME	$120.69	$124.58	$107.17	$130.90	$130.38
COSTS PER LITTER:					
FIXED COSTS:					
Machine + Equip. Ownership*	$ 5.09	$ 6.07	$ 4.06	$ 6.09	$ 4.45
Buildings*	3.49	4.83	2.37	4.02	2.83
Pasture	3.32	3.71	2.41	3.72	3.98
Interest on Hog Investment	2.95	2.57	2.72	3.20	3.81
TOTAL Fixed Costs	$ 14.85	$ 17.18	$ 11.56	$ 17.03	$ 15.07
DIRECT COSTS:					
Machine Operation	$ 1.88	$ 2.13	$ 1.62	$ 1.85	$ 1.96
Feed (Concentrates)	64.69	67.91	58.26	67.15	68.99
Hog Purchases	4.46	3.48	2.69	8.40	6.07
Other: Vet. Expenses	5.60	6.18	4.39	6.56	6.03
Taxes on Hogs	.23	.22	.23	.24	.24
Electricity	.76	.71	.73	.88	.80
Miscellaneous	.71	.85	.62	.42	1.02
TOTAL Direct Costs	$ 78.33	$ 81.48	$ 68.54	$ 85.50	$ 85.11
Total Prod. Costs (Exc. Labor)	$ 93.18	$ 98.66	$ 80.10	$102.53	$100.20
Labor Cost	16.91	24.50	12.70	22.20	8.91
Total Prod. Costs (Inc. Labor)	110.09	$123.16	$ 92.80	$124.73	$109.11
NET INCOME DATA:					
Net Returns to Labor + Mgt.	$ 27.51	$ 25.92	$ 27.07	$ 28.37	$ 30.18
Net Returns to Management	$ 10.60	$ 1.42	$ 14.37	$ 6.17	$ 21.27
Returns per $100 charged for Land, Labor, and Capital	$113.62	$104.84	$118.94	$110.42	$121.54

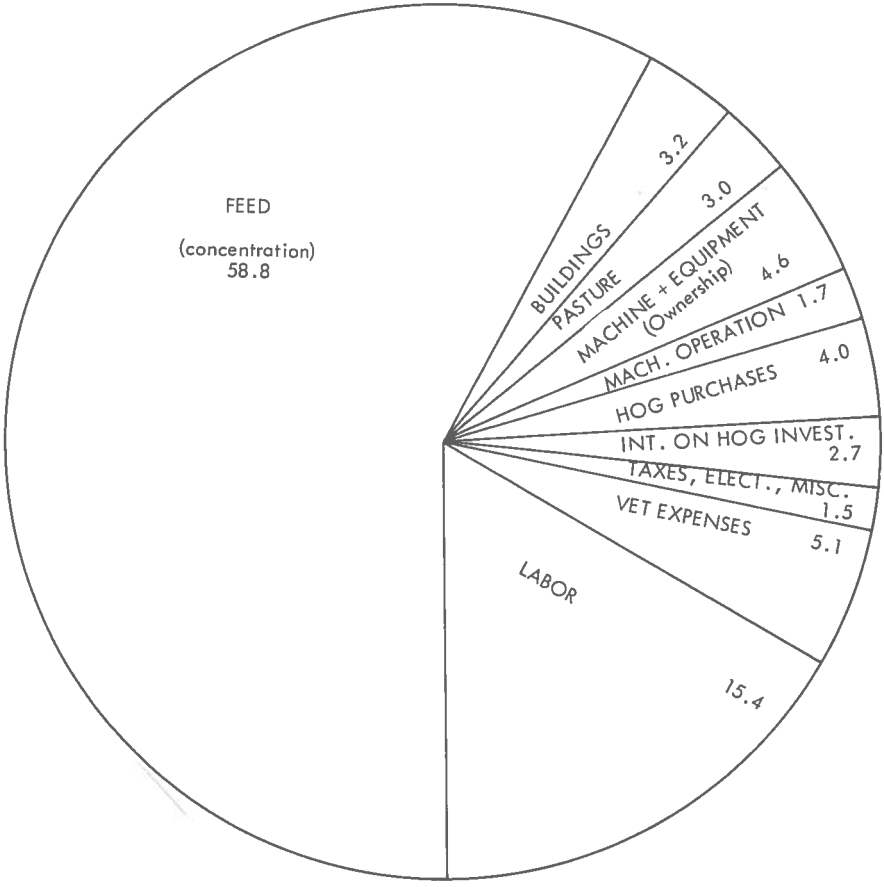
*Ownership costs include depreciation, interest on investment, taxes and insurance. These costs are for hog portion only.

Labor, Machinery and Equipment

Labor, machinery, and equipment together accounted for the second largest cost in the production of feeder pigs. The average farmer spent $16.91 per litter for labor and $6.97 for machinery and equipment. The total of $23.88 amounted to 21.7 percent (Figure 1) of the entire cost of producing feeder pigs. On the average, the labor cost was approximately 2.5 times as great as machine cost. The range in total labor, machinery, and equipment costs per litter varied on individual farms from $6.08 to $91.59. Extremely high labor costs prevailed on two farms.

Machinery and equipment costs were divided into two categories in this study: (1) operation costs and (2) ownership costs. Operation costs include a charge for such items as fuel, lubricants, and repairs. Ownership costs include a charge for depreciation, interest on investment, taxes, and insurance. The fixed ownership costs made up $5.09 of the total $6.97 machinery and equipment costs per litter.

FIG. 1 -- COMPOSITION OF TOTAL COST OF PRODUCING FEEDER PIGS 1962-1963



Buildings

Building costs averaged $3.49 per litter with the building costs on individual farms ranging from .07¢ for the low individual to $18.65 for the high one. On the average, building costs amounted to 3.2 percent of total production costs. Among the factors responsible for this large variation were: differences in number of litters, age and condition of buildings, elaborateness of set-ups, and variation in the building value estimates of individual farmers. A few farmers had virtually no buildings for their feeder pigs.

Pasture

The cost of pasture averaged $3.32 per litter, or 3 percent of total cost of producing feeder pigs. The smallest pasture cost on an individual farm was $.62 per litter, while the largest cost was $14.98. Pasture costs included not only charges for open field pastures, but for woods also. This variation can be attributed to differences in value of land, amount and type of pasture, the number of litters, and other livestock using the pasture (see Appendix B for the method used to determine pasture cost).

Interest on Hog Investment

The average interest charge on the investment in hogs was $3.49 per litter. This amounted to only 2.7 percent of the total cost of production. Interest was charged on the average of the beginning and ending inventories of hogs. Consequently, the interest charge on an individual farm was affected by number of feeder pigs on the farm as of the dates the inventories were taken.

Feed Cost

As expected, feed (concentrates) was the major cost item in the production of feeder pigs. The average farmer spent $64.69 per litter on feed (other than pasture). This amounted to 58.8 percent of the total cost of producing feeder pigs. Feed cost per cwt. of pork produced ranged from $8.79 to $18.33, with an average of $12.39. Adding the pasture charges to the concentrate cost revealed an average total feed cost of $68.01 per litter and $13.01 per cwt. of pork produced. Many factors influence feed costs, but the wide variation points out clearly that considerable emphasis must be placed on holding down feed costs in production of feeder pigs.

Hog Purchases

The farmers spent an average of $4.46 per litter on hog purchases. On individual farms hog purchases ranged from no purchases up to $26.86 per litter. Most purchases were for replacement of breeding stock, thus the amount of herd replacement done during this specific year on individual farms accounts for the large variation.

Marketing Costs

The average marketing cost was $2.96 per litter. As these costs are directly associated with the actual number of pigs sold, it is obvious that farmers raising

the largest number pigs per litter also have the highest per litter marketing cost. The marketing costs also depended upon the market outlet. Producers who sold directly to individual farmers or truckers had no marketing cost (at least no formal charge), whereas those selling through organized feeder pig sales or auctions paid prescribed fees.

Other Costs

Veterinary expenses, including vaccination and medical costs, averaged $5.60 per litter (5.1 percent of the total cost of production). These costs varied considerably with the incidence of disease problems and the vaccination practices followed. Feeder pigs sold through organized sales were subject to a strict vaccination program, but producers selling directly to truckers or other farmers were not always required to vaccinate their pigs.

The remaining cost items were taxes on hogs, electricity, and miscellaneous costs with an average cost of 23¢, 76¢ and 71¢ per litter, respectively. In total, these items amounted to only 1.5 percent of the total cost of producing feeder pigs.

COMPARISON OF SIZE OF ENTERPRISE TO COSTS AND RETURNS

One of the major current trends in U. S. Agriculture is the increasing size of farm businesses. Greater production efficiency is the primary reason usually stated for farmers increasing their size of business. For farmers in the Ozark area this usually means intensifying livestock production rather than increasing crop production due to the nature of the land. One objective of this study therefore was to determine the relationships of size of the feeder pig enterprise to costs and returns.

For this analysis the feeder pig enterprises were divided into four size categories based on the number of litters farrowed. Table 1 gives the average per litter costs and returns data by size of enterprise. Table 2 depicts physical production and capital investment data by size of enterprise. In addition, total enterprise cost and returns data are presented in Table 3 to provide an indication of the magnitude of these items on the total enterprise basis.

Total production costs, excluding labor, averaged approximately the same per litter for enterprises in three of the four size groups. The averages of these groups were around $100 per litter. The one exception was the 21-40 litter category, which had an average total production cost of only $80 per litter.

Nearly all cost items were lower per litter in the 21-40 litter group, but particularly lower were the fixed costs, feed costs, veterinary expenses, and hog purchases. Feed costs (concentrates and pasture) were more than $11 per litter lower, primarily because pigs were sold at a lighter average weight than in the other groups. Some of the other reduced costs were due to the method of operation. Of the three farmers in the entire study who sold all their pigs to individuals, two were in this size group; in addition, four of the eight who sold some of

Table 2. Relationships Between Number of Litters of Feeder Pigs to Various Farm Business Factors

ITEMS	ALL FARMS (38 Farms)	SIZE CATEGORIES (LITTERS) 5-20 (12 Farms)	21-40 (13 Farms)	41-60 (6 Farms)	61-OVER (7 Farms)
Physical Production Data:					
Avg. Number of Litters	37.6	13.0	28.8	48.0	67.0*
Percent of Farrowing Potential**	86.7	87.9	86.9	83.6	87.3
Pigs Farrowed Per Litter	8.6	8.9	8.5	8.0	8.8
Pigs Raised Per Litter	7.0	7.0	7.0	6.6	7.3
Percent of Farrowed Pigs Raised	81.2	79.0	82.7	80.2	82.9
Avg. Weight of Feeder Pigs Sold	59.8	58.0	56.2	69.7	60.1
Total Weight Produced Per Litter	536	576	468	614	526
Per Cwt. Price of Feeder Pigs	$24.71	$23.87	$25.01	$23.96	$26.25
Hours of Labor Used Per Litter	16.9	24.5	12.7	22.2	8.9
Feed Efficiency Data:					
Lbs. of Concent. per 100# PORK	398	285	405	381	421
Price Per 100# CONCENTRATE	$ 3.18	$ 3.27	$ 3.23	$ 2.94	$ 3.16
Cost of Concent. per 100# PORK	12.42	12.08	12.92	11.10	13.18
Gross Returns per $100 Feed	176.35	172.09	179.87	180.96	173.16
Capital Investment Data:					
Equipment***	$ 788.43	$ 315.52	$ 481.73	$1,468.25	$ 1,586.00
Machinery***	212.97	61.61	151.76	254.79	550.29
Buildings***	856.31	427.54	517.92	1,627.40	1,558.86
Hogs	2,261.27	623.19	1,547.80	3,044.14	5,723.40
Land***	1,206.70	552.04	665.90	1,747.08	2,870.14
TOTAL INVESTMENT	$5,325.68	$1,979.90	$3,365.11	$8,141.66	$12,288.69
Percent of Tot. Invest.: Equip.	14.8%	15.9%	14.3%	18.0%	12.9%
Mach.	4.0	3.1	4.5	3.1	4.5
Bldgs.	16.1	21.6	15.4	20.0	12.7
Hogs	42.4	31.5	46.0	37.4	46.6
Land	22.7	27.9	19.8	21.5	23.3
Capital Investment Per Litter	$ 141.64	$ 152.30	$ 117.25	$ 169.62	$ 140.60

*One farm with 210 litters was not included in the average of litter numbers.

**Percent of farrowing potential is a measure of how well the breeding stock is utilized. It is calculated by multiplying the average number of sows and gilts on the farm by 2 (assuming a sow can farrow 2 litters each year) and then dividing the actual number of litters farrowed by this number.

***Hog portion of these investments.

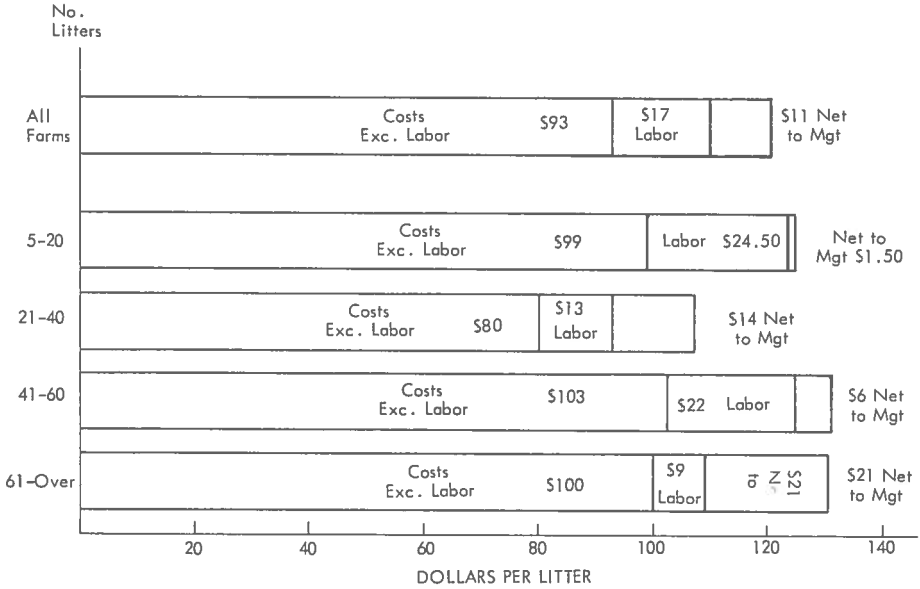
Table 3. Relationships Between Number of Litters and Total Cost and Returns of Feeder Pig Production

ITEMS	ALL FARMS (38 Farms)	SIZE CATEGORIES (LITTERS) 5-20 (12 Farms)	21-40 (13 Farms)	41-60 (6 Farms)	61-OVER (7 Farms)
GROSS INCOME PER FARM:*	$4,685.89	$1,534.47	$3,067.17	$6,236.56	$11,765.41
COSTS PER FARM:					
FIXED COSTS:					
Machine + Equip. Ownership**	$ 177.33	$ 69.45	$ 119.63	$ 287.81	$ 374.73
Buildings**	110.88	54.76	71.82	196.06	206.62
Pasture	120.50	46.80	75.39	168.52	289.48
Interest on Hog Investment	118.95	31.11	77.39	152.21	318.20
TOTAL Fixed Costs	$ 527.66	$ 202.12	$ 344.23	$ 804.60	$ 1,189.03
DIRECT COSTS:					
Machine Operation	85.21	24.17	48.07	87.23	257.10
Feed (Concentrates)	2,537.62	797.39	1,650.39	3,184.29	6,614.27
Hog Purchases	181.01	47.50	71.42	411.67	415.69
Other (Vet., Elect., Etc.)	290.48	102.39	165.55	379.02	769.04
TOTAL Direct Costs	$3,094.32	$ 971.45	$1,935.43	$4,062.21	$ 8,056.10
TOTAL PROD. COSTS (Exc. Labor):	$3,621.98	$1,173.57	$2,279.66	$4,866.81	$ 9,245.13
Labor Cost	542.74	272.08	350.58	948.83	1,015.53
TOTAL PROD. COSTS (Inc. Labor):	$4,164.72	$1,445.65	$2,630.24	$5,815.64	$10,260.66
NET RETURNS PER FARM:					
Net Returns to Labor + Mgt.	$1,063.91	$ 360.90	$ 787.51	$1,369.75	$ 2,520.28
Net Returns to Management	$ 521.17	$ 88.82	$ 436.93	$ 420.92	$ 1,504.75

*Gross returns include sales, plus miscellaneous income, plus or minus adjustment for change in hog inventory.

**Ownership costs include depreciation, interest on investment, taxes and insurance. These costs are for hog portion only.

FIG. 2 -- AVERAGE COSTS AND NET RETURNS TO MANAGEMENT PER LITTER FOR FARMS IN VARIOUS ENTERPRISE SIZE CLASSES



their pigs to individuals were in this group. Consequently, these farmers had lower veterinary expenses (three farmers in this group didn't vaccinate), labor cost and marketing cost. It should also be pointed out that while the average total production cost was $20 per litter lower for this group, average gross income was also $17 to $23 lower than for the other grups.

It is of considerable importance that the production costs per litter (excluding labor) averaged approximately the same in three of the four groups as these three groups encompass the entire range in size of enterprises studied. It indicates that these costs can be kept as low in small enterprises as they can in large enterprises.

When labor costs were included in the total, however, the cost per litter picture changed. Labor costs per litter declined as the size of the feeder pig enterprise increased, to the extent that the labor cost per litter in the 61-over litter class was less than 40 percent of that in the 5-20 litter class. The average labor cost figures in Table 1 tend to hide this relationship, as two producers in the 41-60 litter class had extremely high labor costs. These two producers spent an unusually large amount of time caring for their pigs due to individual circumstances. In addition, labor costs were lower than expected in the 21-40 litter class because of the factors mentioned above.

While a few of the farmers with large enterprises used extraordinary amounts of labor the general statement can also be made that there was more variability in hours of labor used per litter on the small enterprises than on the larger ones.

The average net returns to labor and management per litter increased steadily as the size of feeder pig enterprise increased. The average net returns to labor and management increased from approximately $26 per litter for enterprises in the 5-20 litter class to $30 per litter in the 61-over litter class. The higher gross returns per litter on the farms farrowing more than 40 litters is largely responsible for the higher net returns on the larger enterprises.

A closer inspection of the data revealed that the variation in net returns to labor and management was considerably greater in the smaller size classes than in the larger size classes. Both the farmer with the highest net returns per litter and the farmer with the lowest net returns per litter produced fewer than 21 litters in the record year. While this indicated that in some cases the small feeder pig producer did compete with the large scale producer on a per litter basis the consistency of adequate net returns in enterprises above 40 litters was much greater.

Net returns to management per litter increased much more with increasing size of business than did net returns to labor and management. The obvious reason is less labor used per litter on the larger enterprises. As stated earlier, the average data tended to hide this relationship.**

Differences Between High, Medium, and Low Income Producers

In an effort to discover the major factors determining the level of net income from feeder pig production, the producers in this study were placed into three classes based on net returns to labor and management per litter. A comparison was then made of various production efficiency, cost and returns items for the high, medium, and low income enterprises (Table 4).

The top 13 producers received an average of $44.37 net returns to labor and management per litter, compared with $25.77 for the medium producers and only $12.12 for the low producers. This clearly shows the large variations which did occur in net income, and points out the need for efficient management of this enterprise.

The net income received by a feeder pig producer in a specific year is influenced by many decisions he makes, many actions he takes or doesn't take, and a number of uncontrollable factors. This comparison points out a number of important relationships which contributed to the variation in net income on the farms studied, although the underlying causes must be determined by careful analyses of each individual operation.

Total production costs per litter, including labor, were approximately the same for the high and medium net returns classes, even though net returns were quite different. In fact the entire cost structures of these two groups were very similar on the per litter basis. Toal cost per litter on the farms in the low net returns group averaged over $7 per litter lower than for the higher income groups. A study of the cost structure of the low income group revealed much lower feed cost per litter, lower hog purchases, and lower other costs (veterinary, electricity, etc.). On the other hand, they had a considerably higher labor cost

**See Appendix A for least squares regression analysis of the relationship of enterprise size to net returns per litter.

Table 4. Differences Between High, Medium, and Low Income Feeder Pig Producers, 1962-63

Items	NET RETURNS TO LABOR AND MGT.: High (13 Farms)	Medium (12 Farms)	Low (13 Farms)
Physical Production Data:			
Avg. Number of Litters	37.8	32.1*	26.4
Pigs Farrowed per Litter	8.9	8.7	8.4
Pigs Raised per Litter	7.3	7.6	6.2
Percent of Farrowed Pigs Raised	82.2	87.1	74.8
Percent of Farrowing Potential	89.6	86.0	84.4
Avg. Weight of Feeder Pigs Sold	68.1	58.4	52.8
Total Weight Produced per Litter	643	547	419
Feed Efficiency Data:			
Lbs. of Concent. per 100# PORK	347	382	464
Price per 100# CONCENTRATE	$ 3.09	$ 3.28	$ 3.19
Cost of Concent. per 100# PORK	10.65	12.28	14.28
Gross Returns per $100 Feed Fed	200.40	175.38	153.19
Per Litter Costs of Production:			
FIXED COSTS:			
Machine + Equip. Ownership	$ 5.16	$ 4.99	$ 5.11
Buildings	4.30	2.15	3.92
Pasture	3.40	3.61	2.96
Interest on Hog Investment	3.54	3.05	2.27
TOTAL Fixed Costs	$ 16.40	$ 13.80	$ 14.26
DIRECT COSTS:			
Machine Operation	$ 1.48	$ 1.94	$ 2.22
Feed (Concentrates)	68.53	68.03	57.76
Hog Purchases	4.43	6.32	2.76
Other (Vet., Elect., Etc.)	7.98	8.13	6.01
TOTAL Direct Costs	$ 82.42	$ 84.42	$ 68.75
TOTAL PROD. COSTS (Exc. Labor):	$ 98.82	$ 98.22	$ 83.01
Labor Cost	$ 13.77	$ 14.57	$ 22.25
TOTAL PROD. COSTS (Inc. Labor):	$112.59	$112.79	$105.26
Returns Per Litter:			
Gross Income per	$143.19	$123.99	$ 95.13
Per cwt. Price of Feeder Pigs	24.29	24.17	25.64
NET RETURNS TO LABOR + MGT.	44.37	25.77	12.12
Net Returns to Management	30.60	11.20	-10.13
Capital Investment per Litter	$171.13	$134.98	$141.53
Returns per $100 Charged for Land, Labor, and Capital	$132.91	$114.97	$ 93.09

*This average has been adjusted. One farm in this group with 210 litters would have made the raw average unrealistic thus it was omitted from the calculation.

per litter. At first glance the lower feed costs per litter appear to be a strong point of the farmers in this group, but upon closer examination it is evident that this was in fact a weak point as the amount of pork produced per litter was much lower than in the other groups.

Size of the feeder pig enterprise was a factor in net returns to labor and management variation; the average size of enterprise increased with the increasing level of income (37.8 litters in the high income group vs. 26.4 litters in the low income group). This factor was discussed earlier, but it also must be remembered that the farmer with the highest net returns to labor and management produced only 20 litters.

The sale weight of the feeder pigs was also a major factor in the net returns on these farms. The average weight of feeder pigs sold was 68.1 pounds for the high net income group compared with 58.4 for the medium net income group and 52.8 for the low income group. The analysis is not comprehensive enough to determine an optimum sales weight for feeder pigs, if there is one definite weight that is optimum over a period of time; but on average, the farmers in this study who marketed at heavier weights had higher net returns per litter. The extra income received from the heavier pigs more than covered the costs (particularly feed) to get pigs to heavier weights in this study.

Pigs raised per litter was an important factor in the level of net returns to labor and management. There was not much difference between the average number of pigs raised per litter in the high and the medium income groups, but the producers in the low income group raised only 6.2 pigs per litter. This factor combined with lighter sale weights resulted in a small total weight per litter.

Another factor that stands out is the percent of farrowing potential. This measure, which tells how fully the breeding stock is being utilized, reflects the number of unproductive sows in the herd and the time slippage in the breeding program. A major percentage of the total cost of feeder pig production involves feed and care of the breeding stock, thus the costs of unproductive sows and wasted time must be borne by those litters which are produced. The average percent of farrowing potential for the high income enterprises was 89.6, compared with 86.0 for the medium income enterprises and only 84.4 for the low income enterprises.

Feed efficiency will be discussed in a later section, but its importance should be noted here. Producers in the high income group used only 347 pounds of concentrate per 100 pounds of pork produced, compared with 382 for the medium income producers group and 464 for the low income producers. The cost of concentrates per 100 pounds of pork consequently followed a similar pattern; $10.65 per cwt. of pork for the high income group, $12.28 for the medium group and $14.28 for the low income group. Physical feed conversion, sale weight of pigs, numbers of pigs per litter, and price of concentrates all enter into this measure.

Influence of Pigs Raised Per Litter

Litter size can be very important in determining the profitableness of feeder pig production. Therefore, the producers in this study were divided into three classes based on pigs raised per litter to study this factor's influence. It must be recognized that the complete impact of a single factor, such as pigs weaned per litter, is nearly impossible to determine accurately because of the indirect effects of a factor and the interdependence of many factors.

The data in Table 5 show that the cost of production per litter increased with the increasing number of pigs raised per litter. This was expected, as feed, vaccination, marketing, and other costs are directly related to the number of pigs produced. The important feature, of course, is that net income also increased substantially with increasing litter size. Producers in the high pigs raised per litter class had an average net return to labor and management of $36.40 per litter, more than double the net returns of the low group.

Table 5. Relationships Between Pigs Raised Per Litter and Various Production, Cost and Income Factors

Item	Pigs Weaned Per Litter		
	High Producers (13 Farms)	Medium Producers (12 Farms)	Low Producers (13 Farms)
Physical Production Data:			
Pigs Raised Per Litter	8.1	7.0	5.9
Pigs Farrowed Per Litter	9.4	8.4	8.1
Number of Litters	31.7*	34.8	32.4
Percent of Farrowing Potential	87.2	82.7	90.1
Avg. Weight of Feeder Pigs Sold	65.4	61.9	52.2
Total Weight Produced Per Litter	641	521	369
Feed Efficiency Data:			
Lbs. of Concent. per 100# PORK	375#	372#	445#
Price Per 100# CONCENTRATE	$ 3.26	$ 3.19	$ 3.10
Cost of Concent. per 100# PORK	12.02	11.42	13.70
Per Litter Costs of Production:			
Total Fixed Costs	$ 14.11	$ 20.90	$ 10.00
Total Direct Costs	$ 90.35	$ 84.63	$ 60.65
Labor Cost	$ 16.59	$ 14.02	$ 19.91
TOTAL PROD. COSTS (Inc. Labor):	$121.05	$119.55	$ 90.56
Returns Per Litter:			
Gross Income Per Litter	$140.86	$134.58	$ 87.69
NET RETURNS TO LABOR + MGT.	36.40	29.05	17.04
Net Returns to Management	19.81	15.03	-2.87

*This average has been adjusted. One farm in this group with 210 litters would have made the raw average unrealistic thus it was omitted from the calculation.

The difference in net return to labor and management was particularly large between the medium and low groups. The producers in the low group raised an average of only 5.9 pigs per litter and consequently did not have enough pigs to adequately spread the fixed costs, including feed, associated with maintaining the breeding stock.†

†See Appendix A for regression analysis of the relationship of pigs raised per litter and net returns per litter.

Influence of Feed Efficiency

Feed is the largest item in the total cost of producing feeder pigs. Consequently, feed efficiency, in monetary as well as physical terms, is of primary importance to the profitableness of the feeder pig enterprise. The enterprises studied were divided into three categories on the basis of pounds of concentrate per 100 pounds of pork produced in order to evaluate the importance of this factor. This specific measure indicates feed efficiency in terms of physical efficiency.

Producers in the high efficiency group used an average of 190 pounds less concentrate per cwt. of pork than did the producers in the low efficiency class. The high efficiency producers paid a somewhat higher price per cwt. for concentrates ($3.31 compared with $3.01), but total concentrate cost per 100 pounds of pork produced was much lower for the high efficiency group. Concentrate cost per cwt. of pork amounted to $10.15 on the high efficiency farms, $12.48 on the medium farms, and $14.59 on the low. The average pasture charge per litter was approximately the same for all three groups.

As stated earlier, the exact impact of physical feed efficiency is very difficult to determine because of indirect effects and the interdependence of various factors. For example, the low efficiency farms raised fewer pigs per litter, realized a much lower percent of farrowing potential, and used more labor per litter, in addition to using more feed. Many of these items are interdependent and from the records it is virtually impossible to determine real cause and effect.

The net returns to labor and management increased greatly with increased feed efficiency. The average net return to labor and management per litter was $38.61 on the high efficiency farms and only $14.69 on the low farms.††

††See Appendix A for regression analysis of relationship between physical feeding efficiency and net returns per litter.

Table 6. Relationships Between Pounds of Concentrate Used Per 100 Pounds of Pork Produced and Various Production, Cost, and Income Factors

Items	High Feed Efficiency (Physical) (13 Farms)	Medium Feed Efficiency (Physical) (12 Farms)	Low Feed Efficiency (Physical) (12 Farms)
Feed Efficiency Data:			
Lbs. of Concent. per 100# PORK	307#	390#	497#
Price per 100# CONCENTRATE	$ 3.31	$ 3.24	$ 3.01
Cost of Concent. per 100# PORK	10.15	12.48	14.59
Physical Production Data:			
Avg. Number of Litters	26.8	43.9*	29.8
Pigs Raised Per Litter	7.4	6.9	6.8
Percent of Farrowing Potential	90.2	91.1	79.1
Avg. Weight of Feeder Pigs Sold	59.5	59.2	59.1
Total Weight Produced Per Litter	593	511	502
Per Litter Costs of Production:			
Total Fixed Costs	$ 16.23	$ 13.65	$ 14.50
Total Direct Costs	$ 72.95	$ 79.07	$ 83.03
Labor Cost	$ 15.93	$ 12.31	$ 22.15
TOTAL PROD. COSTS (Inc. Labor):	$105.11	$105.03	$119.68
Returns Per Litter:			
Gross Income Per Litter	$127.79	$122.23	$112.22
NET RETURNS TO LABOR + MGT.	38.61	29.43	14.69
Net Returns to Management	22.68	17.12	-7.46

*This average has been adjusted. One farm in this group with 210 litters would have made the raw average unrealistic thus it was omitted from the calculation.

APPENDIX A

Least-square regression analyses were run to study the relationships between (1) size of enterprise, (2) number of pigs raised per litter, and (3) pounds of concentrate per 100 pounds of pork produced, and net returns to labor and management per litter. The results are illustrated in Figures 3, 4, and 5.

A simple linear regression equation ($Y = a + bX$) was used in each analysis. It should be recognized that the *r* value, the coefficient of correlation, measures the strength of the linear relationship between the independent and dependent variable. It does not necessarily imply a cause-effect relationship.

Size of Enterprise

The analysis produced the regression equation of $Y = 22.96 + .141X$. Y is the estimated net returns to labor and management and X is the number of litters farrowed. The *r* value was determined to be 0.572. While the *r* value is not extremely high, it is high enough to consider size as an important variable on the farms studied. A *t* test showed that both *a* and *b* values were significant at the 95 percent probability level.

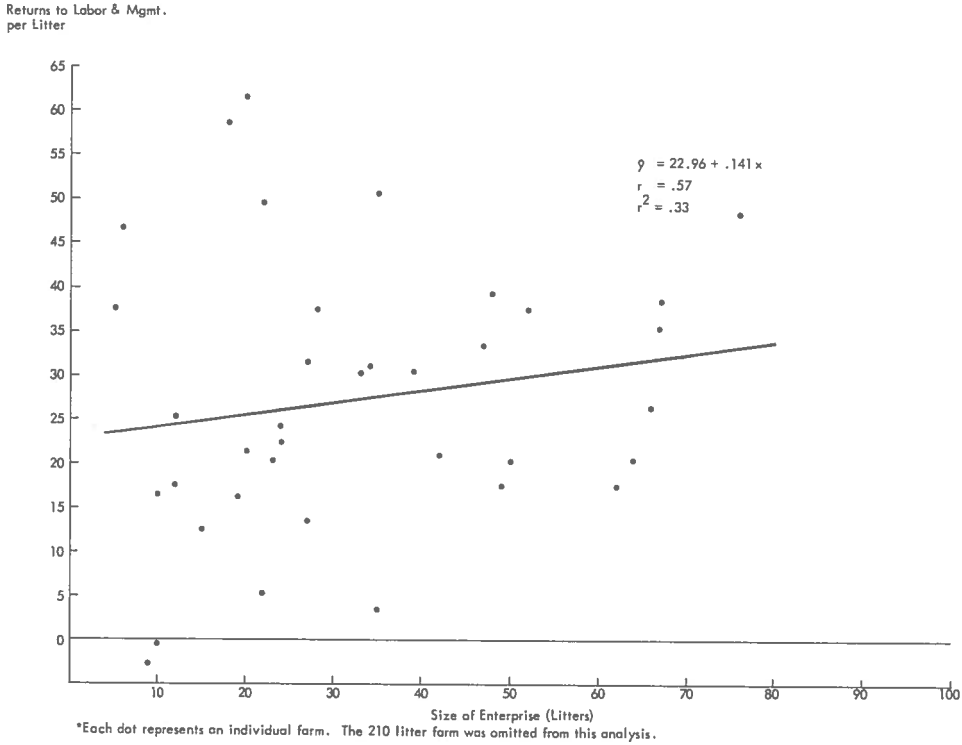
Pigs Raised Per Litter

The analysis of the relationship between pigs raised per litter and net returns to labor and management per litter resulted in the equation $Y = -26.21 + 7.71X$. The *r* value was 0.54, thus showing a medium positive relationship between the two variables. A *t* test revealed that the *a* and *b* values are significant at the 95 percent probability level.

Physical Feed Efficiency

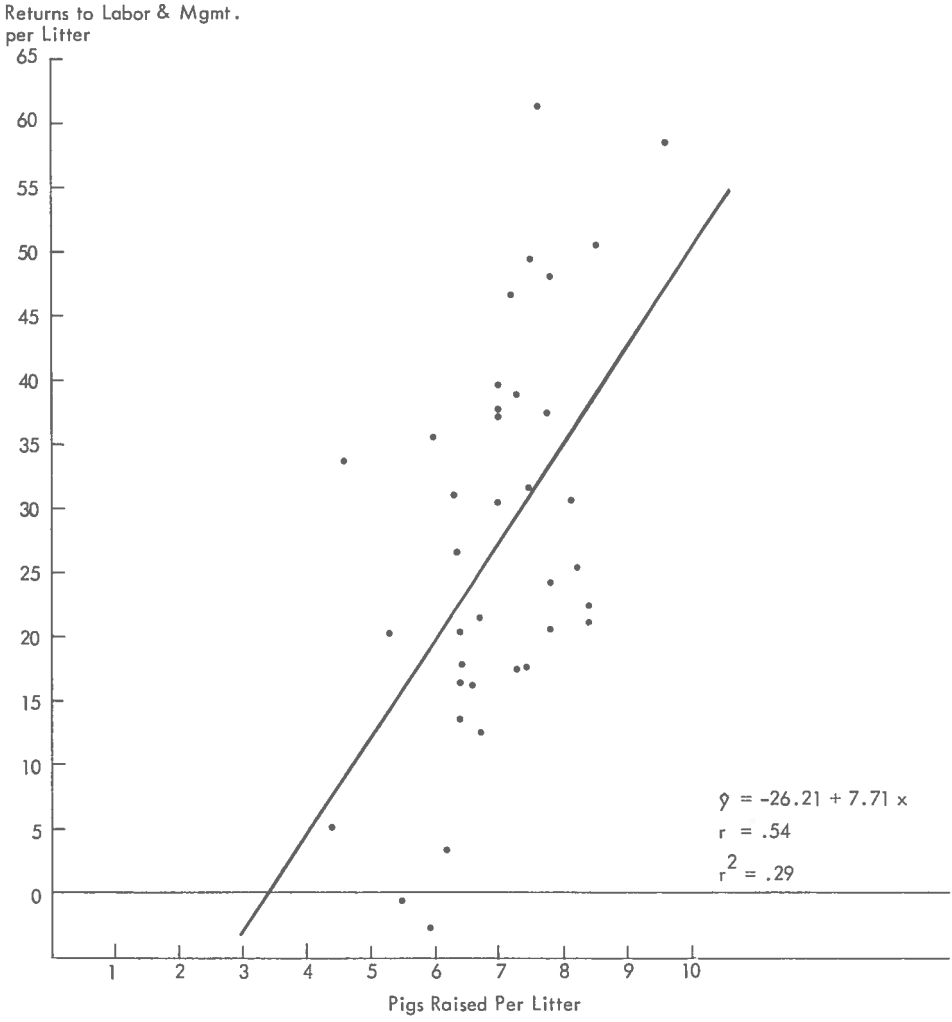
The analysis made on the relationship of pounds of concentrate per 100 pounds of pork and net returns to labor and management per litter gave a regression equation $Y = 73.77 - .116X$. The *r* value was -.66, a relatively strong negative relationship, considering the many variables in feeder pig production. Both *a* and *b* values were significant at the 95 percent probability level.

FIG. 3 -- RELATIONSHIP BETWEEN SIZE OF FEEDER PIG ENTERPRISE AND NET RETURNS TO LABOR AND MANAGEMENT PER LITTER*



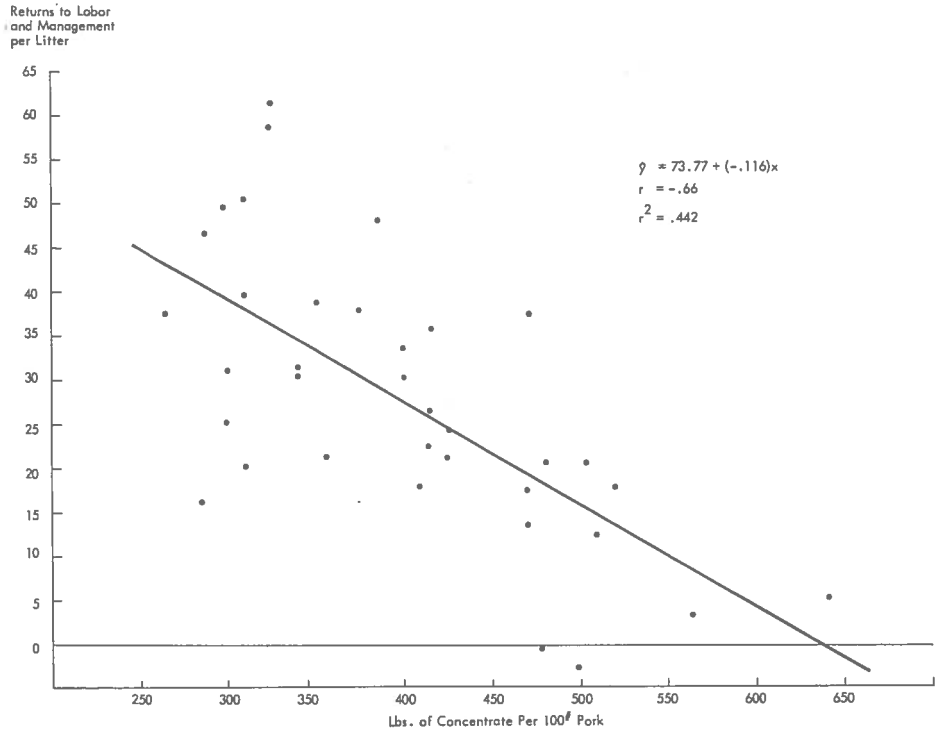
*Each dot represents an individual farm. The 210 litter farm was omitted from this analysis.

FIG. 4 -- RELATIONSHIP BETWEEN PIGS RAISED PER LITTER AND NET RETURNS TO LABOR AND MANAGEMENT PER LITTER*



*Each dot represents an individual farm. The 210 litter farm was omitted from this analysis.

FIG. 5 -- RELATIONSHIP BETWEEN POUNDS OF CONCENTRATE PER 100 POUNDS OF PORK PRODUCED AND NET RETURNS TO LABOR AND MANAGEMENT PER LITTER*



*Each dot represents an individual farm. The 210 litter farm was omitted from this analysis.

APPENDIX B

Methods and Assumptions Used in Calculating Costs and Returns

1. *Machinery & Equipment Charges*

(a) Fixed ownership cost: The 1963 investment in machinery and equipment for the feeder pig enterprise was determined on the basis of use made by the feeder pig enterprise in proportion to total farm use. This was determined for each item. Depreciation on the hog portion was computed on a straight line basis if actual depreciation was not provided in the records. The useful life, when not given, was estimated based on secondary sources of data. Interest on investment was charged at 5 percent. Insurance charges on machinery and equipment were based on rates and practices prevalent in the area. Taxes were estimated using existing county tax rates.

(b) Operating cost of machinery: The costs of fuel, lubricants, and repairs on tractors and trucks used in feeder pig production were based on hours of use. Truck use was charged at $1.15 per hour of actual driving time. Tractor costs were varied from 65¢ to 95¢ per hour depending upon the size of tractor and kind of fuel used. These charges are in reality "averages" based on other research.

2. *Labor Charges*

All labor used was charged at $1.00 per hour, which is the typical charge for labor hired on the hourly or daily basis. A few farmers indicated a somewhat different charge in their neighborhood, but it was felt by the researchers that a uniform charge should be made.

3. *Building Costs*

Total building investment and associated ownership costs were allocated to the feeder pig enterprise on the basis of use made by the feeder pigs in proportion to total use. If not specifically given in the record, building depreciation was computed using a straight line depreciation schedule, a 25 year useful life, and 10 percent salvage value. Interest on investment was charged at 5 percent. Insurance costs were based on prevalent insurance rates and practices followed in the area. Taxes were estimated using tax data supplied by county assessors.

4. *Pasture Cost*

The per acre charge for pasture varied greatly due to type of pasture, extent of use by the hog enterprise, and extent of use by other livestock. Pasture varied all the way from woods (with acorns the main nutrient) to alfalfa. As most pasture was used by more than one livestock enterprise, pasture costs were allocated based on published pasture use standards for different kinds of livestock.

The fixed land costs included interest on the investment (5 percent of the fair market value) and real estate taxes. The farmers estimated the fair market value of their pasture land.

In addition to the fixed land costs an annual "crop" cost was charged. This charge was based on an estimate of the "annual" cost involved in establishing and maintaining the kind of pasture used on the specific farm. The cost of fertilizer applications which last for several years and other establishment costs were spread over the expected life of the pasture. Although sometimes varied because of individual circumstances, the following annual per acre "crop" costs were assumed.

	Seed, Clipping, Etc.	Fertilizer	Total
Woodlots	None	None	None
Unimproved Permanent Pasture	$ 2.50	None	$ 2.50
Improved Permanent Pasture	3.25	4.75 (if none listed)	8.00
Rotation Pasture (Grass and Legumes)	9.00	5.00 " "	14.00
Red Clover after grain (1st yr.)	10.00	2.00 " "	12.00
Red Clover (2nd yr.)	11.00	4.00 " "	15.00
Alfalfa (annual-4 yr.)	13.00	4.00 " "	17.00
Ladino Clover	9.00	5.00 " "	14.00

5. *Interest on Hog Investment*

An interest charge of 5 percent was made on the average of the value of hogs on the farm at the beginning and ending inventories.

6. *Feed Costs*

These were based on the actual feed cost entries made by the individual farmers. In cases where home-raised grain was fed and no price given the following prices were assumed:

Feed	Price/bushel
Corn	$1.10
Wheat	2.00
Oats	.70
Barley	.90
Grain Sorghum	1.00

7. *Other Costs*

Taxes on hogs were based on the tax rates and practices prevailing in each county. Usually this involved a set rate per sow or per adult breeding stock.

The electricity charge was based on the production method used. As the actual cost was often impossible to pull out of the total farm electricity bill, a uniform charge per litter was assumed, if an estimate was not given by the farmer. It was assumed that electricity cost $1.00 per litter (all litters farrowed) on farms where heat lamps or other heating devices were used.

Veterinary fees, medicine, breeding fees, and other cash expenses were charged as recorded by the farmers.

8. *Value of Hogs in Inventories*

Hogs in the beginning and ending inventories were valued based on the average market price (minus transportation and commission) at National Stockyards, East St. Louis, Ill., for the size and class of hogs during the weeks of the inventories. The following prices were assumed:

	August 1, 1962	July 31, 1963
	Price/cwt.	Price/cwt.
Heavy Sows (400# over)	$14.40	$13.40
Light Sows and Gilts	15.70	15.50
Boars	13.00	13.00
Slaughter Hogs--U. S. 1, 2, 3 (used for hogs over 100#)	18.00	17.50
Feeder Pigs		
100# (1.35 x mkt. price slaughter hogs)	24.30	23.62
90# (1.4 x " " " ")	25.20	24.50
80# (1.45 x " " " ")	26.10	25.37
70# (1.5 x " " " ")	27.00	26.25
60# (1.6 x " " " ")	28.80	28.00
50# (1.7 x " " " ")	30.60	29.75
40# (1.8 x " " " ")	32.40	31.50
Suckling Pigs (depending upon weight)	5.00-10.00 each	5.00-10.00 each