

Swine - Cost of prod.

THE EFFECT OF FEED PRICES, FEED EFFICIENCY,
LITTER SIZE, AND PIG WEIGHT ON THE COST
OF PRODUCING FEEDER PIGS

by

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INTRODUCTION

Cyclical variation in slaughter hog production directly influences the demand, supply, and price of feeder pigs. During the last upswing of the cycle, three different groups developed specialized feeder pig programs: producer cooperatives, investors and speculators, and individual farmers. Estimating production costs was important as these producers planned the expansion or contraction of their feeder pig enterprises.

The cost of producing a feeder pig has changed markedly during recent years, as feed prices fluctuated and the cost of other inputs (buildings, equipment, labor, etc.) have increased. In 1962, the average cost of producing a thirty-eight pound pig was \$9.70.^{1/} In 1976, the cost ranged from \$25 to \$35 dollars. Differences in production practices, prices of inputs, type of housing, and managerial skills (feed efficiency, pigs per litter, etc.) are in part responsible for this variation in cost. Individuals contemplating the production of feeder pigs must be able to assess the economic impact of these and other variables on their cost of production. The effect on production costs of changes in four variables (feed prices, feed efficiency, litter size, and pig weight) have been selected for analysis in this paper.

ANALYSIS

The objectives of this analysis were: (1) to estimate the cost of producing a feeder pig under alternative litter size, feed price, feed efficiency, and pig weight situations and (2) to determine how these

^{1/} Blosser, R. H. and D. H. Doster, Cost of Producing Hogs in Ohio, Research bulletin 1001, OARDC, Wooster, Ohio, July, 1967.

variables affect cost. The base data for the analysis (Table 1) were developed by Animal Science and Farm Management Extension faculties at The Ohio State University.

ASSUMPTIONS

The type of housing, farrowing intensity, costs other than feed, labor, and fuel were held constant in the analysis (see Table 1). Slotted floor farrowing and nursery and open-front gestation facilities were used. Six groups of sows were farrowed twice a year and labor was charged at \$3.50 per hour. The supplement appearing in Table 1 was replaced with soybean oil meal and a mineral-vitamin pre-mix. The pre-mix was charged 20¢ per pound. The remaining costs were charged at one-half the stated level in Table 1 to arrive at a per litter charge.

METHOD

Five variables affecting the cost of producing feeder pigs were evaluated by utilizing a computer program for calculations. The effects of eight corn prices, six soybean oil meal prices, seven feed efficiencies, seven litter sizes, and three feeder pig weights were reported as an addendum to this bulletin (Table 2).^{2/} Reported in this paper are average prices and efficiency measures reflecting current (1976) economic conditions and good management practices.

^{2/} The addendum entitled, "What Does It Cost To Produce Feeder Pigs" may be obtained by contacting the Ohio Cooperative Extension Service.

Table 1. FEEDER PIG PRODUCTION BUDGET - 1976^{1/}
 High Investment Facilities
 Farrow 6X Per Year
 Sow and 2 Litters

| ITEM | QUANTITY | UNIT | PRICE | AMOUNT |
|---|-------------|-------------|-------|--------------|
| Receipts ^{2/} | | | | |
| Feeder pigs (15 @ 55 lbs) | 8.25 | cwt. | \$90 | \$743 |
| Cull Sows | 2.1 | cwt. | 45 | 94 |
| Total receipts | | | | <u>\$837</u> |
| Expenses | | | | |
| Variable | | | | |
| Feed | | | | |
| Corn | 54 | bu. | 2.75 | \$149 |
| Purchased supplement ^{3/} | 12 | cwt. | 10.00 | 120 |
| Total Feed Cost | | | | <u>\$269</u> |
| Labor | 18 | hr. | 3.50 | 63 |
| Vet. and medicine | | | | 7 |
| Breeding | | | | 7 |
| Marketing ^{4/} | | | | 21 |
| Elec., and fuel | | | | 39 |
| Miscellaneous | | | | 8 |
| Interest on aver. oper. cap ^{5/} | \$104 | @ | 9% | 9 |
| Interest on breeding herd ^{6/} | 248 | @ | 9% | 22 |
| Total Variable Expense | | | | <u>\$445</u> |
| Fixed ^{7/} | | | | |
| Equipment | \$340 | @ | 20% | \$ 68 |
| Buildings and facilities | 345 | @ | 17% | 59 |
| Total Fixed Expense | | | | <u>\$127</u> |
| Total Expenses | | | | <u>\$572</u> |
| Profit and Return to Management | Feeder pigs | @ \$ 70/cwt | | \$ 99 |
| | | @ \$ 90/cwt | | \$265 |
| | | @ \$110/cwt | | \$430 |

Source: Ohio Livestock Budgets - 1976

Table 2. LEVEL OF VARIABLES IN EXPERIMENT

| Variable | Level of Variable | | | | | | | |
|--|-------------------|--------|--------|--------|--------|--------|--------|--------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Corn Price (\$/bu.) | \$2.00 | \$2.20 | \$2.40 | \$2.60 | \$2.80 | \$3.00 | \$3.20 | \$3.50 |
| Pigs Weaned Per Litter ^{1/} (No.) | 6.5 | 7.0 | 7.5 | 8.0 | 8.5 | 9.0 | 9.5 | |
| Feed Per Pig Sold ^{2/} (lbs.) | | | | | | | | |
| 40 Pound Pig | 195 | 220 | 245 | 270 | 295 | 320 | 345 | |
| 50 Pound Pig | 212 | 237 | 262 | 287 | 312 | 337 | 362 | |
| 60 Pound Pig | 235 | 260 | 285 | 310 | 335 | 360 | 385 | |
| Soybean Meal Price (¢/lb.) | 5¢ | 6¢ | 7¢ | 8¢ | 9¢ | 10¢ | | |
| Pig Weight (lbs.) | 40 | 50 | 60 | | | | | |

^{1/} One-half (1/2) pig less per litter was sold to allow for gilt replacement and death loss.

^{2/} For 7 1/2 pigs per litter.

RESULTS

COST PER PIG

A sample of the data and the economic interdependency between the respective variables and the cost of production are illustrated in Table 3.

Table 3. COST OF PRODUCING FEEDER PIGS UNDER ALTERNATIVE PIG WEIGHT, LITTER SIZE, FEED EFFICIENCY AND FEED PRICE SITUATIONS

| Per Weight (lbs.) | Pigs Weaned Per Litter | Feed ^{1/} Per Pig Sold (lbs.) | Corn Price (\$/bu.) | | | |
|-------------------|------------------------|--|---------------------|---------|--------------------|---------|
| | | | \$2.20 | | \$2.60 | |
| | | | SBOM Price (¢/lb.) | | SBOM Price (¢/lb.) | |
| | | | 7¢ | 8¢ | 7¢ | 8¢ |
| | | | (\$ Per Pig) | | | |
| 40 | 9 | 205 | \$21.84 | \$22.22 | \$23.05 | \$23.43 |
| 40 | 9 | 255 | 24.45 | 24.92 | 25.95 | 26.42 |
| 40 | 7 | 262 | 27.52 | 27.99 | 29.07 | 29.54 |
| 40 | 7 | 312 | 30.12 | 30.68 | 31.97 | 32.53 |
| 50 | 9 | 222 | 23.01 | 23.42 | 24.32 | 24.73 |
| 50 | 9 | 272 | 25.63 | 26.14 | 27.23 | 27.74 |
| 50 | 7 | 279 | 28.69 | 29.19 | 30.34 | 30.85 |
| 50 | 7 | 329 | 31.41 | 32.00 | 33.36 | 33.95 |
| 60 | 9 | 245 | 24.51 | 24.97 | 25.95 | 26.41 |
| 60 | 9 | 295 | 27.12 | 27.67 | 28.86 | 29.40 |
| 60 | 7 | 302 | 30.18 | 30.73 | 31.97 | 32.52 |
| 60 | 7 | 352 | 32.78 | 33.42 | 34.87 | 35.51 |

^{1/} Corn and supplement fed to sows, boars, and pigs as per Table 1.

The lowest cost pig was the smallest pig (40 pounds), from the largest litter (9.0 pigs), consuming the least amount of feed (205 lbs.), at the lowest feed prices (\$2.20 corn and 7¢ soybean oil meal). The cost increased as pig weight increased, number of pigs per litter decreased, feed consumed increased, and/or feed prices increased. These relationships became clearer as each variable was isolated and studied in detail.

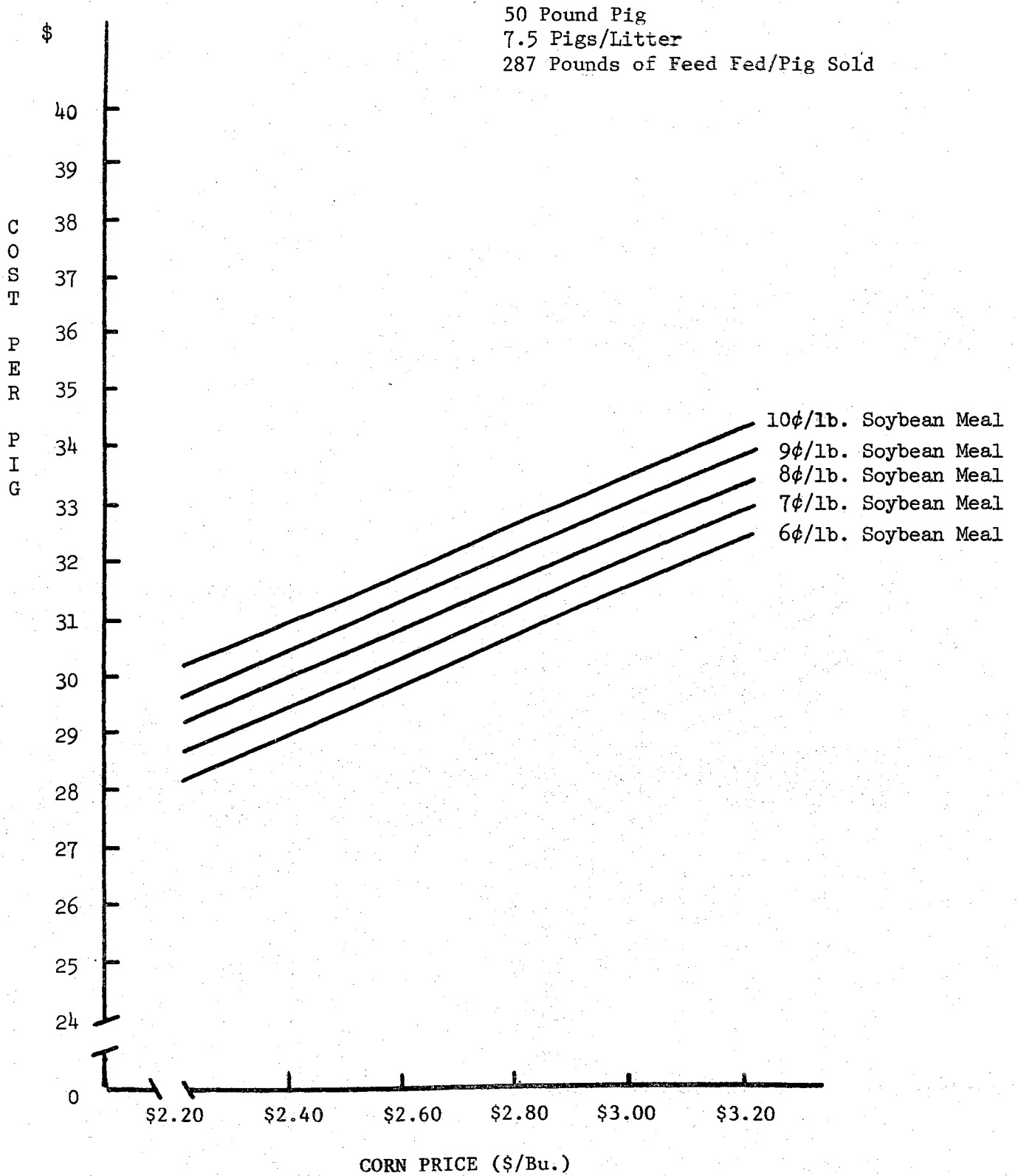
EFFECT OF FEED PRICES

Figure 1 illustrates the effect of changing feed prices on the cost of producing a 50 pound pig when litter size and feed usage were held at 7.5 and 287 pounds respectively. The same general relationships held true for other levels of litter size and feed efficiency.

When all other variables were held constant, changing the price of corn by 20¢ per bushel changed the cost per pig by 84¢; changing the price of soybean oil meal by 1¢ per pound (\$20 per ton) changed the cost per pig 52¢. The influence of feed price changes on costs varied with changes in other variables (pig weight, pigs weaned, and feed efficiency) (Table 3). Examples of the influence of these interrelationships require further explanation.

Increased feed prices were more costly to those producers producing larger pigs, weaning smaller litters, and/or using more feed per pig sold. Changing the price of corn by 10¢ per bushel resulted in a 30¢ change in the cost per pig for producer selling 40 pound pigs from 9 pig litters using two hundred five pounds of feed per pig sold (Table 4). As pig weight increased, as litter size decreased, and/or as feed per pig sold

FIGURE 1. COST/PIG ASSOCIATED WITH CORN AND SOYBEAN MEAL PRICES



increased, the change in cost per pig increased. For example, the change in cost was 52¢ for a 60 pound pig from a litter of 7 consuming 352 pounds of feed; 22¢ more than in the previous example (Table 4). This difference became larger as the change in corn price increased.

TABLE 4. CHANGE IN COST PER PIG ASSOCIATED WITH CHANGE IN FEED PRICES

| Pig Weight | Pigs Weaned Per Litter | Feed Per Pig Sold | Change in Cost Per Pig | |
|------------|------------------------|-------------------|--|----------------------------|
| | | | Soybean Oil Meal 10¢ Change Per Pound | Corn 10¢ Change Per Bu. |
| 40 | 9 | 205 | \$.19 | \$.30 |
| 40 | 9 | 255 | .24 | .38 |
| 40 | 7 | 262 | .24 | .39 |
| 40 | 7 | 312 | .28 | .46 |
| 50 | 9 | 222 | .21 | .33 |
| 50 | 9 | 272 | .26 | .40 |
| 50 | 7 | 279 | .25 | .41 |
| 50 | 7 | 329 | .30 | .49 |
| 60 | 9 | 245 | .23 | .36 |
| 60 | 9 | 295 | .28 | .43 |
| 60 | 7 | 302 | .28 | .45 |
| 60 | 7 | 352 | .32 | .52 |

This suggests that increases in feed prices increase the cost of production more rapidly for inefficient managers (smaller litter sizes and more feed used). A more complete analysis of the effect of the management variables follows.

EFFECT OF MANAGEMENT

In this analysis the effect of management was interpreted in terms of weight of pigs sold, litter size, and amount of feed per pig sold. The effect of each of these variables was examined independently followed by an analysis of the compounding effects of litter size and feed efficiency.

Litter Size

If all other variables were held constant, increases in the size of the litter decreased the cost per pig (Figures 2). The reduction in cost per pig as litter size increased was largely a function of spreading the overhead costs associated with maintaining sows and boars--(buildings, livestock, labor, feed, and etc.) over more units. The cost of producing a 50 pound pig was \$33.48 for a producer averaging 6.5 pigs per litter and paying \$2.40 per bushel for corn. Increasing the litter size by increments of .5 to 9.5 reduced the cost to \$24.46 (see Table 5).

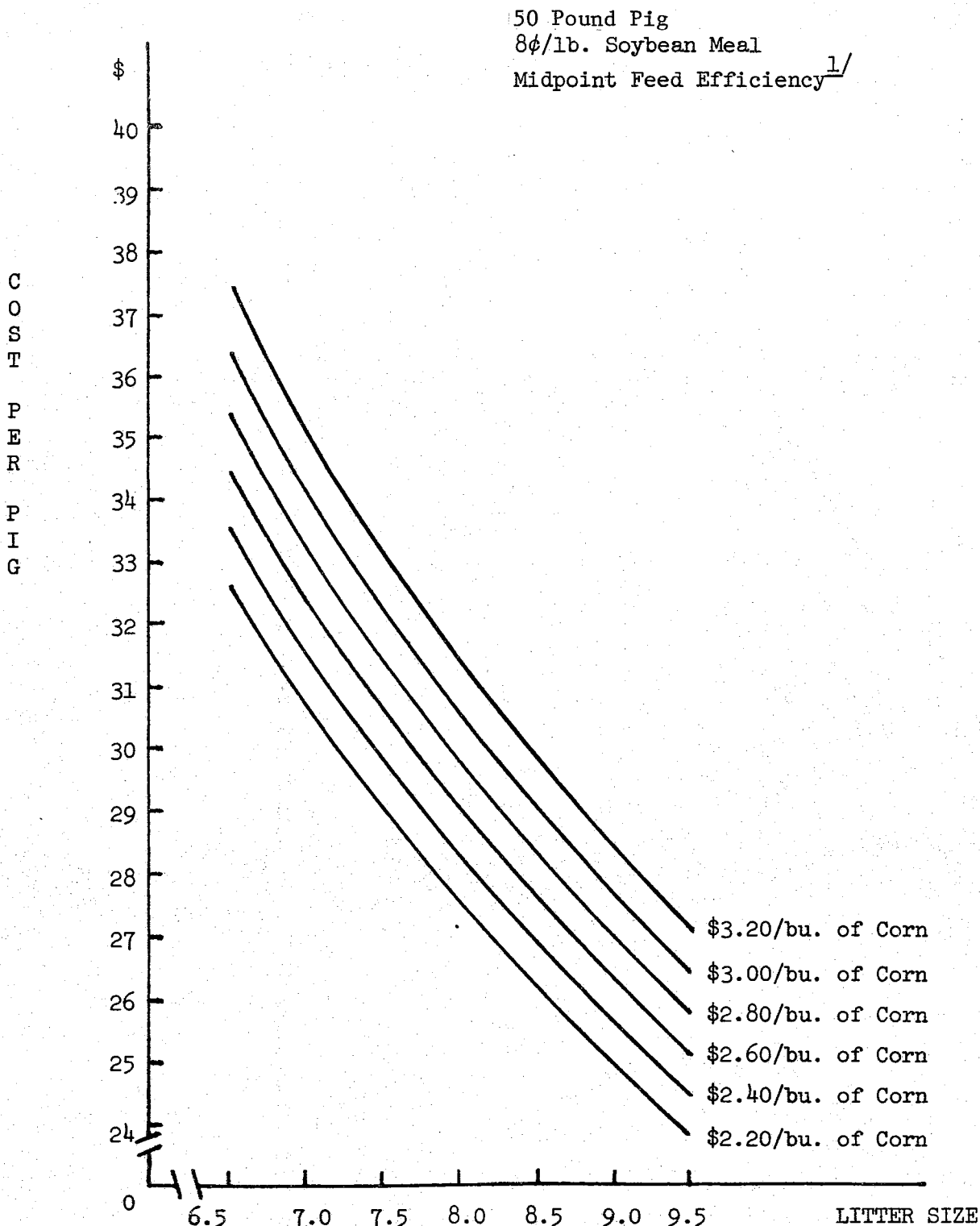
Increasing the litter size by equal increments did not decrease costs by equal increments. The smaller the initial litter size, the more costs were reduced by increasing the litter size. This is evident in Figure 2 and perhaps was best demonstrated in Table 5. The diminishing slope of the lines in Figure 2 graphically illustrates the decrease in cost associated with increased litter size. Poor managers in terms

Table 5. COST PER PIG ASSOCIATED WITH LITTER SIZE^{1/}

| Litter Size | Cost Per Pig | Reduction in Cost Per Pig |
|-------------|--------------|---------------------------|
| 6.5 | \$33.48 | \$2.04 |
| 7.0 | 31.44 | 1.74 |
| 7.5 | 29.70 | 1.56 |
| 8.0 | 28.14 | 1.39 |
| 8.5 | 26.75 | 1.25 |
| 9.0 | 25.50 | 1.04 |
| 9.5 | 24.46 | |

^{1/}Data from Figure 2 using \$2.40 corn price.

FIGURE 2. COST PER PIG ASSOCIATED WITH LITTER SIZE AND CORN PRICE



1. 324 lbs. of Feed/Pig Sold for 6 1/2 Pig Litters
304 lbs. of Feed/Pig Sold for 7 Pig Litters
287 lbs. of Feed/Pig Sold for 7 1/2 Pig Litters
272 lbs. of Feed/Pig Sold for 8 Pig Litters
259 lbs. of Feed/Pig Sold for 8 1/2 Pig Litters
247 lbs. of Feed/Pig Sold for 9 Pig Litters
237 lbs. of Feed/Pig Sold for 9 1/2 Pig Litters

of pigs weaned per litter, clearly have more to gain (more reduction in cost per pig) by saving more pigs than do the better managers.

Changing feed prices, pig weight, and/or feed efficiency didn't change this observed economic relationship. Increasing feed prices (see Figure 2) increased the cost per pig for each litter size examined; the lower cost and diminishing reduction in cost associated with increasing litter size were still very much in evidence.

Pig Weight

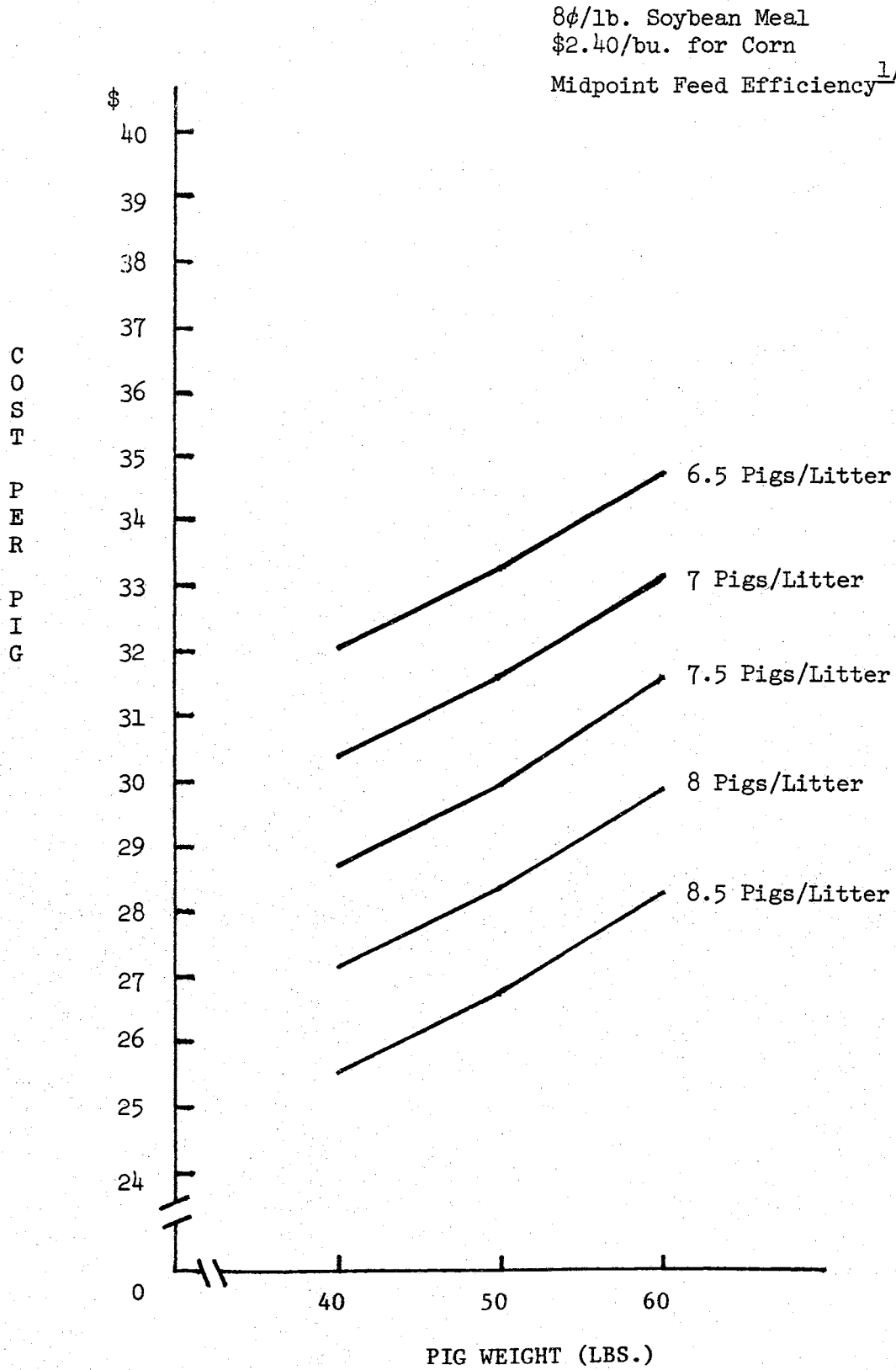
Cost per pig increased with additional weight (Figure 3). The costs of producing a 40, 50, and 60 pound pig when litter size is 7.5 were \$28.74, \$30.01, and \$31.65, respectively. The increased costs were the result of additional feed being fed. The increasing slope of the lines in Figure 3 indicate that it was more costly to raise a pig from 50 to 60 pounds than from 40 to 50 pounds. The increased cost to add an additional ten pounds between 50 and 60 pounds reflects a decrease in the pig's ability to convert feed to body weight as the animal gets older.

Many of the relationships exhibited in Figure 2 are also evident in Figure 3. Smaller litters resulted in a higher cost per pig. The smaller the initial litter size, the more cost can be reduced by increasing the number of pigs weaned per litter.

Feed Efficiency

Feed cost constitutes nearly half (47%) of the cost of producing feeder pigs (see Table 1). A manager's ability to reduce the feed required to produce a pig will substantially decrease the cost of production. The effect of alternative feed efficiencies upon the cost of producing a feeder

FIGURE 3. COST PER PIG ASSOCIATED WITH PIG WEIGHT AND LITTER SIZE



1. Feed Fed/Pig Varies With Litter Size and Pig Weight (see Figure 2. footnotes)

pig is illustrated in Figure 4. A "good" manager will probably feed approximately 287 pounds of feed for each pig produced. As expected, increases in feed requirements increased the cost per pig. With corn at \$2.60 per bushel, a producer using 237 pounds of feed per pig sold had a cost of \$28.10 per pig. Increasing the amount of feed fed to 262, 287, and 337 pounds increased the cost per pig to \$29.62, \$31.14, \$32.68, and \$34.21, respectively. Each additional 25 pounds of feed resulted in \$1.48 higher cost per pig.

Notice also in Figure 4 the slopes of the lines corresponding to different prices of corn. The higher the price of corn, the steeper the slope. The lines become farther apart as the amount of feed required increases. This re-emphasizes a point made earlier in this analysis. Higher feed prices were more costly to the poorer manager. The information in Table 6 will help in understanding this relationship.

Increasing the price of corn by 40¢ per bushel increases the cost per pig by \$1.25, \$1.69, and \$2.13 when the amounts of feed used were 212, 287, and 363 respectively. Higher feed prices provide additional economic incentive to use feed more efficiently. Increasing feed costs penalizes the poorer manager. If feeder pig prices are relatively low, the poorer manager must improve feed efficiency, operate at a loss, or cease to produce feeder pigs.

FIGURE 4. COST PER PIG ASSOCIATED WITH CHANGES IN FEED EFFICIENCY AND CORN PRICE

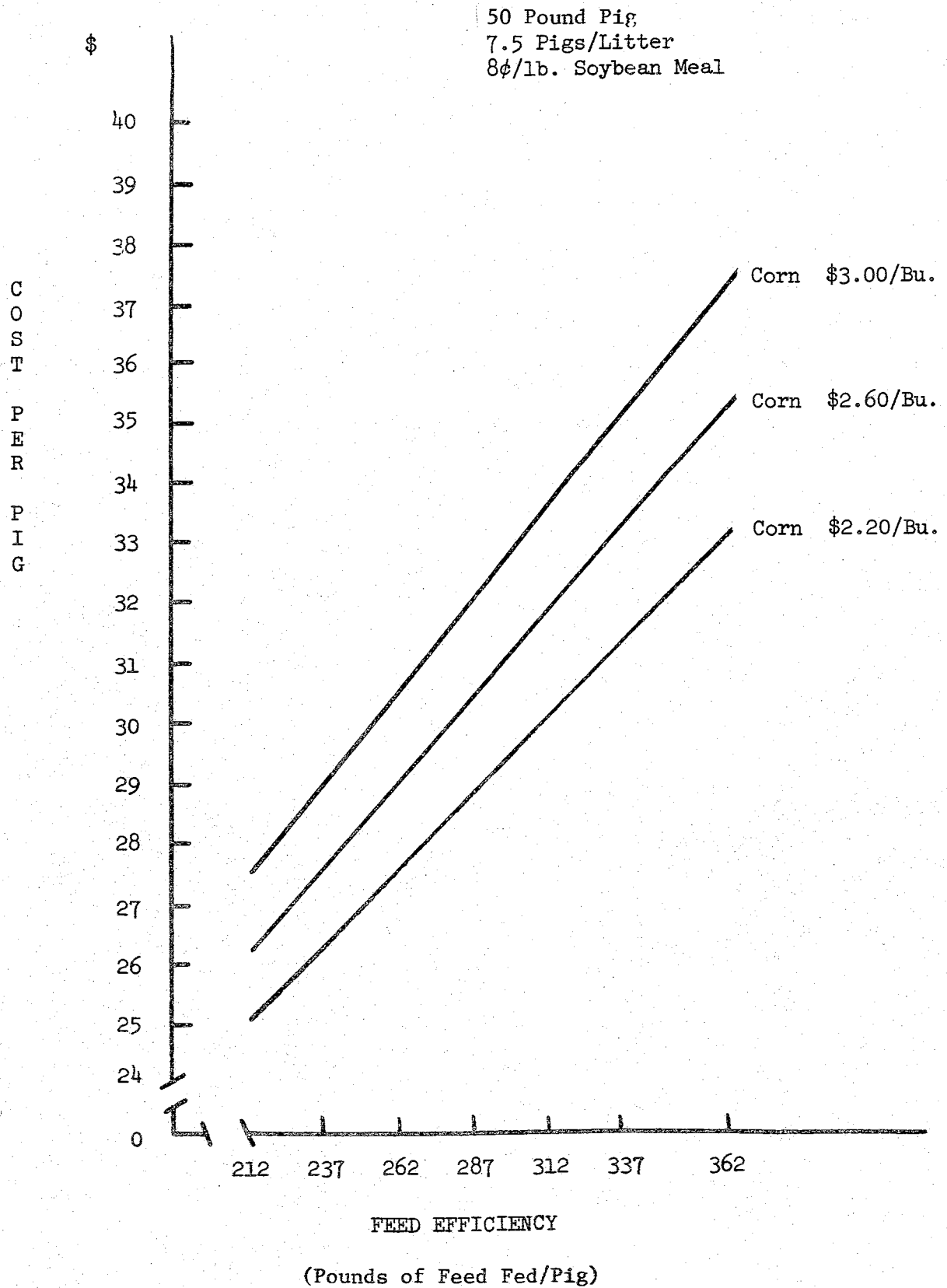


Table 6. EFFECT OF FEED EFFICIENCY AND CORN PRICES ON COST PER PIG

| Pounds of Feed Fed Per Pig | Price of Corn | Cost Per Pig | Increase in Cost Per Pig |
|----------------------------|---------------|--------------|--------------------------|
| 212 | 2.20 | 25.03 | |
| 212 | 2.60 | 26.27 | 1.24 |
| 212 | 3.00 | 27.52 | 1.25 |
| 287 | 2.20 | 29.16 | |
| 287 | 2.60 | 30.84 | 1.68 |
| 287 | 3.00 | 32.53 | 1.69 |
| 362 | 2.20 | 33.31 | |
| 362 | 2.60 | 35.43 | 2.12 |
| 362 | 3.00 | 37.56 | 2.13 |

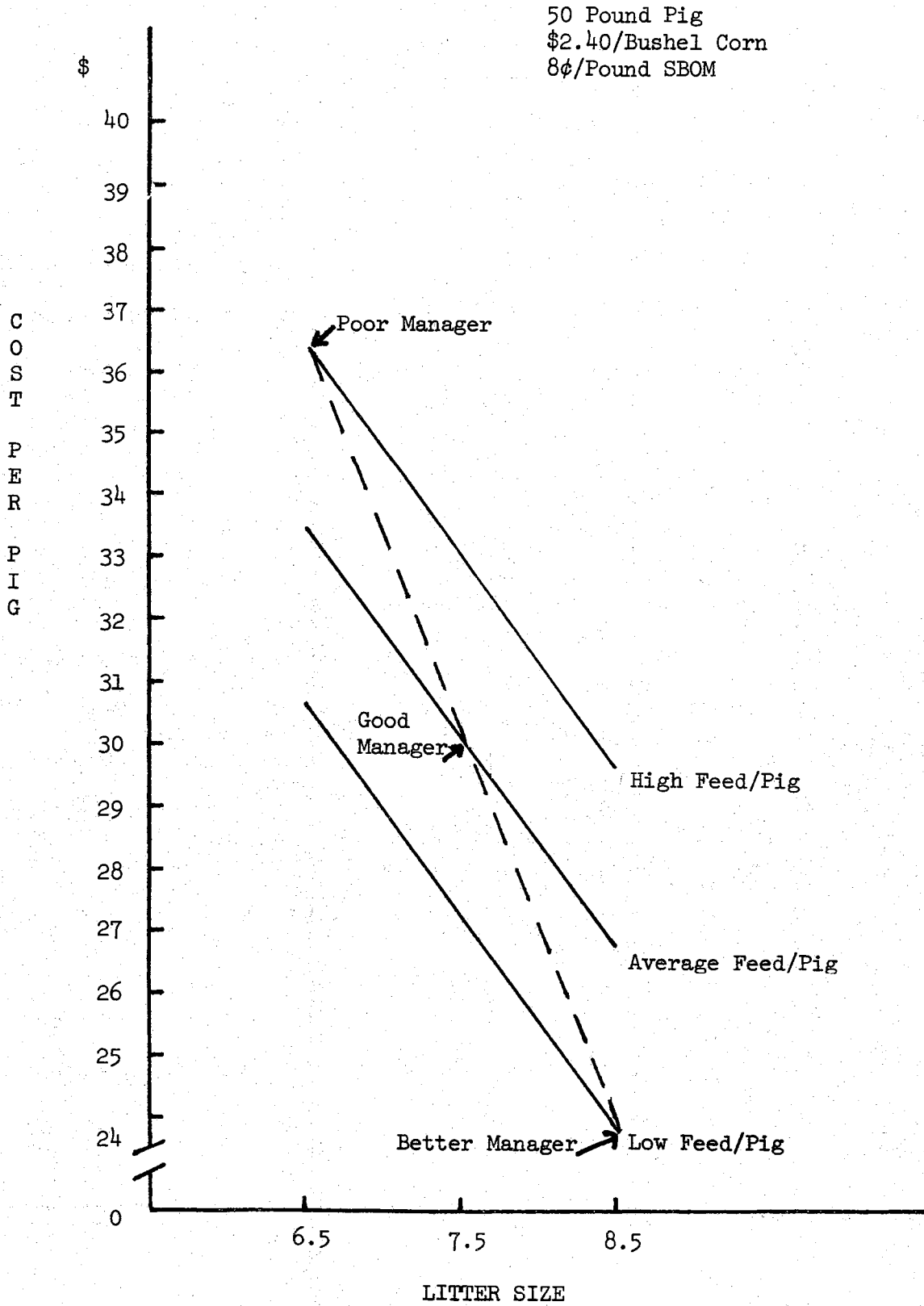
Litter Size and Feed Efficiency

Given that a producer has contracted to produce a given size pig (50 pounds) and that feed was purchased at relatively low prices (corn at \$2.40 and soybean oil meal at 8¢), it was important to evaluate the compounded effect of a manager's ability (influence on litter size and feed efficiency) on production costs and profits. The results of this analysis are presented in Table 7 and Figure 5.

Table 7. EFFECT OF LITTER SIZE AND FEED EFFICIENCY ON COST PER PIG

| Litter Size | Pounds of Feed Fed Per Pig Sold | Cost Per Pig |
|-------------|---------------------------------|--------------|
| 6.5 | 374 | \$36.33 |
| 6.5 | 324 | 33.48 |
| 6.5 | 274 | 30.65 |
| 7.5 | 337 | 32.92 |
| 7.5 | 287 | 30.00 |
| 7.5 | 237 | 27.10 |
| 8.5 | 309 | 29.61 |
| 8.5 | 259 | 26.75 |
| 8.5 | 209 | 23.90 |

FIGURE 5. COST PER PIG ASSOCIATED WITH LITTER SIZE AND FEED EFFICIENCY



The intersections of the broken line with the solid lines in Figure 5 represent poor, good, and better management situations. Under poor management (6.5 pigs weaned per litter and high feed used per pig sold) the cost per pig was \$36.33. Under good management (7.5 pigs and average feed usage) the cost per pig decreased to \$30. When the better management example was examined (8.5 pigs and low feed usage) the cost decreased further to \$23.90. The better manager was able to produce a pig for \$12.43 less than the poor manager - a sizable incentive to encourage improvement in management ability. Continued increases in management ability, more pigs weaned per litter and lower feed requirements per pig sold, would lead to still further reductions in cost, but at a decreasing rate.

SUMMARY AND IMPLICATIONS

There is not one dollar figure that can be used as "the cost" of producing feeder pigs. The cost, even with a given set of buildings and equipment, varies widely. The variation in cost presented in this analysis was the result of the independent and compounded effect of feed prices and management ability measured in terms of feed efficiency, pig weight, and litter size. Still greater variation would have been evident if alternative types of facilities (pasture, pen, solid floors) and intensities of use (1, 2, 4, 6, 8, 10, 12 litter systems) had been included in the analysis.

The analysis of the independent effect of feed prices on cost was not very enlightening (see Figure 1). It is quite evident, even without this analysis, that higher feed prices will result in higher cost pigs. This is not to suggest that there is no value in knowing that a 20¢ change in

the price of corn will result in a 57¢ change in pig cost. Obviously the precise change in cost associated with changes in feed prices vary with management expertise. The interaction (compounded effect) of feed prices and the related management variables in the analysis provided some very interesting and useful information.

The analysis suggests that a given increase in the price of corn (or feed in general) was more costly to the "poor" manager than it was to the "good" manager. Conversely, a decrease in feed cost benefits the "poor" manager more than it does the "good" manager (see Table 4). This was primarily due to the high proportion of total feed cost that was fixed. The amount of feed required for the boars and sows was relatively constant regardless of the number of pigs weaned per litter. The producer weaning more pigs per litter can spread any increase in feed prices over more pigs, resulting in a smaller increase in cost per pig.

When considering investing in a new facility, producers must also remember the effect of overhead costs on profits. With the range of prices examined, annual costs for buildings and equipment accounted for 21 to 27 percent of the total cost of production. If the buildings and equipment are to be financed with borrowed capital, principal and interest can be a heavy burden on cash flow. This puts added pressure on doing a top job of production.

The effect of management ability on the cost of producing a feeder pig was very pronounced. The independent and compounded effects of litter size, feed efficiency, and pig weight shown in Figures 2 through 5 show very clearly that good management pays off. Non-farm investors and farmers

interested in forming pig cooperatives can look at this analysis and easily see the importance of hiring good management. The additional salary required to hire a high quality manager may be more than offset by the expected reduction in production costs. An additional five to ten thousand dollars to get the better manager who could sell one more pig per litter and reduce feed consumption by ten to twenty percent is a good investment.

For example, using facilities similar to those in this analysis a hired manager-herdsman should have little difficulty in farrowing 200 sows. A manager who can wean 8.5 pigs per litter rather than 6.5 and use 30 to 50 percent less feed per pig than a less qualified manager can increase annual profit up to \$35,000 (Table 8).

Table 8. PROFIT ATTRIBUTABLE TO MANAGEMENT

Feeder Pig Production

| Managerial ^{1/} Ability | Market Price Per Pig | Total Cost Per Pig | Profit Per Pig | Pigs ^{2/} Sold | Total ^{3/} Profit |
|-------------------------------------|-------------------------|-----------------------|-------------------|----------------------------|-------------------------------|
| Poor | \$30 | \$36.33 | \$-6.33 | 2400 | \$-15,000 |
| Good | 30 | 30.00 | 0 | 2800 | 0 |
| Better | 30 | 23.90 | 6.10 | 3200 | 20,000 |

^{1/} See Figure 5.

^{2/} Pigs sold per litter 1/2 less than litter size.

^{3/} Rounded.

Whether to raise feeder pigs to heavier weights is a question that is answered indirectly by the analysis. By combining the presentation in Figure 3 with the expected sale price, it is possible to make his determination. In most instances, it appears that it would be profitable to sell heavier pigs. The additional cost per pound might be expected to vary between 10¢ and 20¢ depending upon litter size, feed prices and feed efficiency. As long as the price per pound for pigs exceeds this cost it will pay to feed the pigs to a heavier weight. The ability of the manager to continually assess the market and his cost of production and decide which weight is most profitable will result in higher earnings.

The analysis presented in this paper can be a valuable aid to investors and/or producers as they make plans to enter, expand, or reorganize a feeder pig production enterprise. The effect of management skills on the cost of producing a pig is clear. The cost per pig can vary as much as \$12.00 depending upon the skill of the manager, measured in terms of pigs per litter and feed used per pig sold. The "better" manager will reduce the impact of high feed prices and is worth considerably more (can be paid more) than the "poor" or even the "good" manager. By reducing costs with "good or better" management, the firm is better able to sustain itself through the on-going hog price cycle. During prosperous periods higher profits will be earned. During the low part of the cycle, losses may be minimized.