



# pork industry handbook

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## Economics of Reproductive Performance and Breeding Herd Management

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During the summer of 1977 it was costing about \$29 to produce a 40-lb. feeder pig if one did not deduct the salvage value of breeding stock and tax savings on breeding stock sales. This production cost can be achieved with feed costs of 6-7 cents per pound and with the use of modern facilities and equipment if one can obtain 1.7 litters per female in the herd and 8.0 pigs weaned per litter. While these production goals are higher than the national average of 1.5 and 7.3, respectively, they are realistic.

These figures can be determined for your herd by dividing the total number of pigs weaned per year by the number of farrowings during the year; and by dividing the total number of farrowings that occurred during the year by the average number of females in the herd. The average number of females in the herd is determined from monthly inventories, and gilts are included in the inventories from the time they are 6 months of age. The accompanying Monthly Breeding Stock and Production Inventory Record will be helpful in measuring your herd's performance.

### Salvage Value of Breeding Stock

About 50% of the costs of producing a 40-lb. feeder pig are feed costs. Most of this is feed cost for the breeding herd. However, some of this feed cost is recovered in weight gain, since the sow enters the herd as a 220-lb. replacement gilt and accumulates 150-300 lb. additional weight during her productive lifetime. Admittedly, some sows die, and the salvage value per pound decreases as the sow gains in weight; but nonetheless, salvage value of the home-raised breeding stock reduces the net cost to produce a weaned pig.

A gilt normally gains more weight during gestation than a sow because she is still growing. Thus, the cost of producing pigs out of gilts is not as high as it would appear to be based on the number of days in the breeding herd and the litter size produced. Studies indicate that gilts are in the

herd about 270 days by the time they wean their first litter, and that they wean about 6.6 pigs per litter. Sows average 208 days in the herd, per litter produced, and wean about 7.9 pigs per litter during their second and subsequent litters.

Depending on market prices, gilts increase in value by \$25-75 from the time of their selection as 220-lb. replacement gilts until they are sold as packers at weights of 350-500 lb. This \$25-75 value increase can be considered either additional income or can be used to defray the cost of producing weaned pigs. Dividing the value of the increase by the number of pigs produced during the sow's lifetime gives the value on a per pig basis. Since most of the increase in value occurs during the first litter and since the number of pigs per litter is usually less than 7, the value per pig is considerably higher (\$3-5 per pig) than it is for pigs from sows that are kept for as many as 4 litters and produce more than 30 pigs.

### Tax Savings

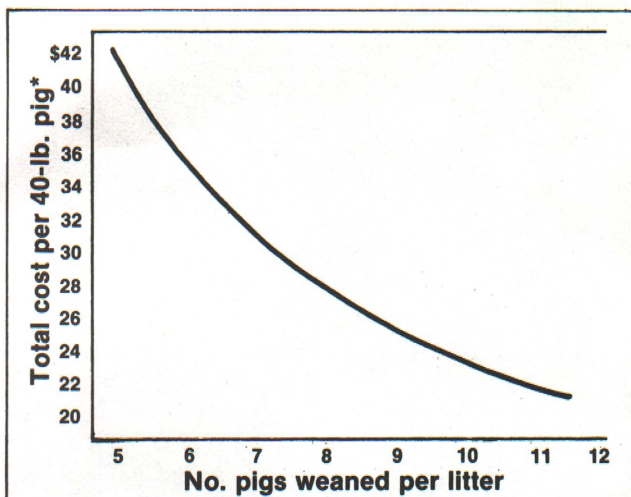
Using the cash basis for reporting income, our federal tax system allows a producer to pay a much lower rate of federal income tax on the income from the sale of raised swine breeding stock which is held 12 months or more. This item markedly influences the after-tax cost of producing feeder pigs and tends to encourage producers who are in the higher income tax brackets to maintain young breeding herds.

Income from the sale of breeding stock for a 1-litter system and for a 4-litter system can differ considerably, as shown in Table 1.

Adding to this tax saving advantage of the 1-litter system is the added tax paid on the profit from the sale of 6.9 additional pigs with the 4-litter system.

The net effect of the increase in salvage value and tax savings at the above production rates and prices is about \$7.50 per pig advantage for the 1-litter system. This

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\*These costs are based on feed costs of 6-7 cents per pound and labor at \$4.00 per hour.

**Figure 1. Effect of number of pigs weaned per litter on the cost of producing a 40-lb. pig.**

**Table 1. Tax considerations of 1-litter system as compared to 4-litter system.**

	1-litter system	4-litter system
No. litters	4.00	4.00
No. pigs weaned	26.40	30.30
No. pigs sold	22.40	29.30
Value of sow sales	\$575.00	\$160.00
Amount not taxable	\$287.50	\$ 80.00
Tax savings		
25% tax bracket	\$ 71.88	\$ 20.00
Tax savings/litter	\$ 17.97	\$ 5.00
Tax savings/pig		
25% bracket	\$ 2.72	\$ 0.66

amount can be used to offset the higher feed and production costs of the 1-litter system.

### Reduce Feed Costs

There are two ways to reduce sow feed costs per pig even when sows are fed properly. First, wean more pigs per litter and, second, produce more litters (and total pigs) per sow per year. The feed savings from weaning more pigs per litter are rather obvious. It doesn't take any more feed during gestation to feed a sow carrying a larger litter than it does to feed one carrying a small litter. Likewise, it doesn't take much more feed for a sow nursing a large litter as compared to a small litter.

### Wean More Pigs per Litter

Some of the other production costs per pig are also reduced as the number of pigs weaned per litter is increased. Facilities, labor, interest on capital, power, fuel, electrical and medical expenses—all are lower per pig when the total costs can be shared by more pigs.

Figure 1 shows the effect of number weaned per litter on total production costs.

The costs shown in Figure 1 are based on 1.7 litters per sow per year. Costs of production are reduced \$2-5 per pig for each additional pig that can be weaned per litter. Weaning 9 instead of 8 reduced production costs by \$2.35 per pig.

A number of practices have been reported to be useful in increasing the number of pigs weaned per litter. Refer to the PIH Fact Sheets listed at the end of this publication.

### More Litters per Year

Farrowing more litters per year from each female is another method of reducing production costs per pig. Our inability to shorten the gestation period limits the amount of improvement we can expect to make in this area. The gestation period is only 114 days, and yet most of our pork producers are allowing over 215 days per litter ( $365 \div 1.7$  litters = 215). Under optimal conditions, one could expect a second-litter sow to take 114 days for gestation, 21-28 days for lactation and 6 days to return to estrus. This would give a total of 141-148 days per litter. This level is sometimes achieved by individual sows in a herd but is not obtained on a herd basis. The proportion of gilts in the breeding herd, the number of non-breeders, and conception rates of only 70-80% add to the total female days per litter farrowed. Nevertheless, improvements can be made and savings in production costs can be noted.

Increasing the number of litters per sow per year reduces the sow feed costs for non-gestating periods or for a given number of pigs, and it reduces both the size of the breeding herd and the gestating sow facilities required (see Table 2). Gilts enter the breeding herd when they are 6 months of age, and with the addition of a high percentage of gilts the number of litters per female per year is reduced because:

- Gilts are usually not exposed for breeding until they are 7-8 months of age.
- It takes 21 days for them to be exposed to a first service.
- Animals not showing heat and non-conceiving animals are often not culled until they have been in residence for a large number of days.
- Gilt herds usually have lower conception rates than sow herds, especially when the breeding herd is in total confinement.

Therefore, herds that achieve a high number of litters per female per year usually have experienced higher conception rates and have a higher percentage of mature sows.

Table 3 illustrates the effect of increased litters per female per year on production costs. But it omits the reduction in costs associated with salvage value of the sow and capital gains income tax benefits where the lower litters per female per year is due to an increase in proportion of gilt farrowings.

If one plans and designs a given capacity in gestation and farrowing facilities and equipment for a productivity of 1.7 litters per year, holds the size of the breeding herd constant, and then experiences only 1.3, the results can be considerably different (see Table 4).

In addition to building costs, other costs per pig will also be higher. These include higher feed costs, higher boar costs, higher capital costs, higher fuel and power costs, and either higher labor costs or poorer utilization of the labor that is available.

Many management practices can be utilized to improve the number of litters produced per female per year. The following practices can be helpful.

### Increasing Profits in the Breeding Herd

- Identify each sow in the herd.
- Keep records of breeding dates and boars used.
- Shorten lactation periods to 3 weeks.
- Breed at first heat after weaning.
- Cull non-breeders after 2 heat cycles.
- Pregnancy test non-cycling animals.
- Breed twice at each heat period.

There are still other related management problems that may affect or modify the assumed goal of achieving high reproductive efficiency. The management techniques that

**Table 2. Yearly sow herd size per 100 farrowings with varying numbers of litters per sow per year.**

Litters/sow/year	Average no. sows
1.2	83
1.3	77
1.4	71
1.5	67
1.6	62
1.7	59
1.8	56
1.9	53
2.0	50

**Table 3. Effect of the number of litters per female per year on cost of producing pigs.**

No. litters/female/year	Cost of 40-lb. pigs
1.4	\$31.00
1.6	30.00
1.8	28.50
2.0	28.00

These costs are based on feed costs of 6-7 cents per pound and labor at \$4.00 per hour. They are also based on 8 pigs weaned per litter. It is assumed that when the number of litters per sow per year is reduced the size of the breeding herd is increased so that the herd farrows the same number of litters per year.

### Monthly Breeding Stock and Production Inventory Record (1)

Year 19\_\_

Column	1	2	3	4	5	6
	No. sows (2)	No. gilts (3)	No. sows and gilts farrowed	No. live pigs farrowed	No. litters weaned	No. pigs weaned
Jan.						
Feb.						
Mar.						
Apr.						
May						
June						
July						
Aug.						
Sept.						
Oct.						
Nov.						
Dec.						
Total						

- (1) Enter these data on the last day of each month.
- (2) Replacements are counted as gilts until they wean their first litter.
- (3) Gilts are counted in the breeding herd when they are selected out of the finishing lot.

Complete the information below at the end of the year.

- A. Column 1 \_\_\_ + column 2 \_\_\_ ÷ 12 = average sow herd size
- B. Column 5 total \_\_\_ ÷ average sow herd size \_\_\_ = litters per sow per year \_\_\_
- C. Column 6 total \_\_\_ ÷ average sow herd size \_\_\_ = pigs weaned per sow per year \_\_\_

will give a measure of control over many of these problems are not yet well defined. The accompanying Breeding Herd Efficiency Worksheet can help you determine your variable costs per pig weaned. It is designed so that you can use production figures from your own experience.

Additional information on improving reproductive efficiency can be found in the following PIH Fact Sheets.

- PIH-1 Management of the Boar
- PIH-8 Managing Sows and Gilts During Breeding and Gestation for Efficient Reproduction
- PIH-18 Baby Pig Management—Birth to Weaning
- PIH-46 Care of the Sow During Farrowing and Lactation

**Table 4. Effect of reproductive performance and building costs on cost per pig produced.**

Percent capacity	100%		75%	
Litters/sow/year	1.7		1.3	
Number weaned/litter	9	7	9	7
Farrowing				
\$1,000/sow capacity	\$3.50	\$4.50	\$4.69	\$6.03
Nursery				
\$42/pig capacity	1.25	1.43	1.48	1.90
Gestation				
\$200/sow capacity	2.00	2.57	2.61	3.36
Total	\$6.75	\$8.50	\$8.78	\$11.29

### Breeding Herd Efficiency Worksheet

I. Total cost per farrowing:

	<u>Gilt</u> <u>system</u>	<u>Gilt &amp;</u> <u>sow</u> <u>system</u>
A. Feed and time related costs*		
1. Lactation _____ days × \$ _____ per day =	\$ _____	\$ _____
2. Gestation <u>114</u> days × \$ _____ per day =	\$ _____	\$ _____
3. Breeding days and boar cost		
<u>25</u> days × \$ _____ per day =	\$ _____	\$ _____
4. Prebreeding and culling†		
_____ days × \$ _____ per day =	\$ _____	\$ _____
5. Cost per farrowing	\$ _____	\$ _____
B. Gain in salvage value	<u>Gilt</u>	<u>Sow</u>
1. Salvage value (weight × price) =	_____	_____
2. Cost of female (220 lb. × price) =	_____	_____
3. Net cost (line 1 - line 2)	_____	_____
4. No. of farrowings	<u>1</u>	_____
5. Net cost/farrowing (line 3 ÷ line 4)	\$ _____	\$ _____
C. Income tax savings (raised breeding stock)		
1. Salvage value (weight × price) =	_____	_____
2. Number of farrowings	<u>1</u>	_____
3. Salvage value per farrowing	_____	_____
4. Tax bracket _____ % ÷ 2 × line 3 =	\$ _____	\$ _____
D. Total cost/farrowing (line A5 - line B5 - line C4) =	\$ _____	\$ _____

II. Average number of pigs weaned during breeding life:

A. 1st litter _____ pigs weaned.		
B. 2nd litter _____ pigs weaned.		
C. 3rd litter _____ pigs weaned.		
D. 4th litter _____ pigs weaned.		
E. 5th litter _____ pigs weaned.		
F. Total _____ pigs weaned.		
G. Average number weaned per farrowing	_____	_____

III. Average variable cost per pig weaned:

Total cost per farrowing (ID) divided by the average number of pigs weaned per litter (IIG) equals the variable cost per pig weaned.	\$ _____	\$ _____
	\$ _____	\$ _____

The following values can be used if actual values are not available:

\* Cost of feed × 2 for lactation and breeding charges. Feed cost plus 30% for gestation, prebreeding and culling days.

† Prebreeding and culling days:

Gilts 100 days/litter

1 gilt litter, 1 sow litter = 69 days/litter

1 gilt litter, 2 sow litters = 58 days/litter

1 gilt litter, 3 sow litters = 53 days/litter

1 gilt litter, 4 sow litters = 50 days/litter