

Two-litter Outdoor Farrowing System Budget

Benjamin Larson, senior undergraduate;
Mark Honeyman, associate professor of animal
science; and James Kliebenstein, professor of
economics

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Summary and Implications

A two-litter pasture farrowing herd of 100 sows was budgeted. Based on current market prices (1996) and marketing 7.5 feeder pigs per litter, the cost of production was \$37 per 50 lb pig for all costs or \$31 per 50 lb pig excluding labor. Sensitivity analysis clearly showed that pasture farrowing is competitive as a land use with corn and soybean production.

Introduction

Outdoor farrowing has been gaining popularity in England and more recently in parts of the United States, e.g., Oklahoma, Colorado, and Georgia. Outdoor farrowing is attractive because of low fixed costs. Concerns about animal welfare and the effects of confinement swine operations on the environment and on worker health have encouraged producers to reevaluate outdoor production systems. Outdoor swine production was widely used in Iowa 50 years ago but has been largely replaced with confinement systems. Outdoor farrowing is often viewed as old-fashioned or out-of-date. To determine its potential a budget was prepared using current pig production costs and techniques to demonstrate the viability of outdoor farrowing for moderate-sized, family-based pork producers.

Management practice. The budget was constructed based on a 100-head sow herd farrowing twice per year (March and September). Natural service hand mating is used. Feeder pigs are sold at approximately 50 lb.

Land management. The outdoor swine production system was structured to use as little land as possible and to practice double cropping of land when the season permits in Iowa.

During the winter, gestating sows are penned on a cornstalk field. This allows waste corn to be gleaned at an estimated 5 bushels per acre. For the analysis two sows per acre was estimated. This practice helps to reduce feed cost and may reduce herbicide costs. Moreover, manure application is natural by the animal and fertilizer needs are reduced slightly. Fertilizer needs also are slightly reduced. Cornstalks can be harvested from the

land for bedding or cattle feed or hogs do not effectively use them.

Spring farrowing uses land that was in a sod crop the previous year. There are 10 sows per acre. After weaning, the young pigs are restricted to half the area. This allows half the land to be used as normal crop land. The other half can be planted to early season soybeans or a sod crop that can be used as next year's dry lot.

The dry lot is used both as the summer gestation area and a year-round breeding area. For budgeting purposes, it was assumed that there were 20 sows per acre during this phase. This limits land use and allows for the sows to be divided into smaller groups.

Fall farrowing is based on 10 sows per acre on a sod crop. Legume crops, such as Berseem clover or red clover, spring planted with oats, allow for oat straw to be harvested plus a hay crop.

Land cost is budgeted at the rent value or \$110 per annually per acre. This value is the land expense in the ISU (2) for land capable of producing 135 bushels of corn. This value was used to allow a comparison of the land profit from corn and soybean production. Cornstalks were not expensed to the budget.

Facilities. Housing for gestating sows is 12 ft by 20 ft portable, wooden sheds. These sheds, which can be moved to reduce manure buildup, are used for both winter and summer housing.

Modified A-frame huts are used for farrowing. The floorless, plywood huts are inexpensive and were selected because they have been shown to limit the number of live pigs crushed (3). Two weeks after the pigs are born, the huts are replaced by 12 ft by 20 ft wooden sheds. At weaning, the sows are moved out of the sheds and the pigs are raised in the same sheds until marketed (50 lb). This allows the farrowing huts to be used twice during each farrowing season. The 12 ft by 20 ft sheds are the same type used in gestation and provided added flexibility.

Gestation fencing is an electric fence. Farrowing fencing uses "electronet" that divides the sows into 1-acre paddocks and prevents small pigs from escaping.

Portable, light-weight plastic pipe and tanks are used for summer watering. The tanks help prevent mud holes from forming while at the same time providing a reserve in case of a temporary loss of water. Energy-free waterers are used in the winter.

The facilities and costs are shown in Table 1 and were assumed to last 10 years. Also, it is assumed that facility repair cost is \$5 per litter.

Because all the facilities are to be bought on loan, an interest rate of 9% (market rate) is used on the average cost of the facilities (the facilities cost divided by two). This value is then divided by two litters per year and then again by 100 sows per farrowing period.

Support equipment other than the hog mover were shared with other farm enterprises or with recreational uses, e.g., the four-wheel, all-terrain vehicle. The tractor was needed for 15 full days out of the year at \$20/day.

Feeding. Gestation feeding is done with feed troughs or portable, wooden platforms. This helps to spread manure on fields and enables the manager to keep a closer eye on the sow herd. It also reduces feed waste. A bulk bin is used for feed storage. Feeding also could be done using cubes.

During farrowing and the nursery period, portable 60-bushel self-feeders are used. This helps reduce feeding labor, leaving more time for attending farrowing. The cost of the corn was assumed to be \$2.50/bu. Feed amounts were taken from Life Cycle Swine Nutrition (7) (Table 2).

Breeding and farrowing. Farrowing occurs at the end of March and September, which are months that will not conflict with crop production. Marketing the feeder pigs should avoid seasonal lows on pig prices. Breeding is done by hand mating, which increases labor. However, it will reduce confusion during farrowing. Hand mating also can increase live pigs born if done properly. The same results also could be achieved through the use of artificial insemination. Purchase prices are based on market values (Table 2). Breeding stock would be from a producer who has been farrowing outdoors. Live pigs born was assumed to be nine pigs per litter with 1.5 pigs lost per litter from birth to market (feeder pigs).

Labor. Labor was assumed to be 6 hours per litter at \$7 per hour (Table 2). Labor was left as a separate category because of the wide variation in the amount of labor needed per litter in pasture production due to the size of the herd. Larger herds usually require less time per litter (4).

Other variable costs. Marketing costs of the feeder pigs, including transportation (Table 2), was taken from the Pork Industry Handbook budgets for a two-litter pasture system (1). This will fluctuate greatly depending on distance and type of sale contracts. For example, selling to a neighbor that will pick up the animals would have substantially lower expense. All other variable costs were estimates based on current prices and industry norms agreed upon by the authors (Table 2).

Revenues. The feeder pig price (Table 2) was based on information from the USDA/NASS (6). Cull sow prices

based on an estimated market value related to current prices.

Results and Discussion

Break-even costs. Using the assumptions and cost information provided in Tables 1 and 2, the income over variable costs was \$141.60 per litter or \$18.88 per feeder pig marketed. Total fixed costs were \$46.26 per litter or \$6.17 per feeder pig marketed. Return income over all costs, net income or return to management was \$53.35 per litter or \$7.11 per pig. Break-even of all costs was \$36.89 per pig or \$31.29 per pig, excluding labor. These are generally competitive production costs when compared with alternative systems.

Return on investment. A summary of the return on investment for one litter of pigs in a two-litter outdoor system producing feeder pigs follows:

Facilities investment per sow* (Table 1)	\$265.93
Breeding Stock investment per sow (Table 2)	<u>\$188.14</u>
Total investment per sow	\$454.07
Return on investment per litter	\$70.42
% Return on investment per litter	15.5%

Facilities investment is the average investment for one sow ($531.85/2 = 265.93$) (Table 1). The average investment is half of the new cost because the end value of the facilities is zero.

Breeding stock investment is the average of the purchase prices, and total cull sale prices, including a 2% death loss for the sows. This number is then divided by 2 to determine the average ($\$500 * .1 \text{ boar} + \$.30 * 600 \text{ lb} * .1 \text{ boar} + \$175 \text{ per one sow} + \$.34 * 400 \text{ lb} * .98 \text{ sow}$)/2 = \$188.14 (Table 2).

Total investment is the facilities and breeding stock investment added together ($\$188.14 + \$265.93 = \$454.07$).

Net return on investment equals the return to labor and management (\$95.35) minus labor (\$42.00) (used as an opportunity cost) plus the cost of interest (\$5.10 and \$11.97) or, = $\$95.35 - \$42 + \$5.10 + \11.97 (Table 2) = \$70.42

The percent return on investment per litter is the net return per litter divided by the total investment per sow multiplied by 100 ($\$70.42/\$454.07 = 15.5\%$).

* Land is not considered in the facilities investment. It is not a depreciable asset and costs have been deducted.

Sensitivity analysis. A sensitivity table of three different feeder pig break-even prices in response to selected corn

and supplement prices shown in Table 3. The break-even variable price is the feeder pig sales price needed to cover variable costs, excluding labor. Total break-even price is the amount needed to cover all costs, including labor. For example, at \$2.50/bu corn and \$.18/lb supplement, which are the costs used in the budget, a producer would need a feeder pig price of \$25/head to cover variable costs and \$37/head to cover total costs. A price of \$31/head is needed to cover all costs, except labor.

The return to management and labor for selected corn and supplement prices and the feeder pig prices ranging from \$25–\$60 per head is shown in Table 4. For example, if the corn price is \$2.50/bu and the supplement price is \$.18/lb, and the feeder pig selling price is \$40/head, the return to management is \$23/litter. Labor is included at a cost of \$42/litter. However, if the feeder pig prices increase to \$50/head then the return to management would be \$98/litter. If at the same time the price of feeder pigs increased, the price of corn and supplement prices increased to \$3.50 and \$.26, respectively, then the return to management is \$54/litter.

The return to management per acre of land used in feeder pig production with land return at \$110 per acre and .07 acres per litter is shown in Table 5. It is designed to be read in the same manner as Table 4.

The return to management of an acre of \$110 cash rent land used in corn grain production is shown in Table 6. The values used are from the estimated ISU Cost of Crop Production in Iowa 1996 for a budget of corn following soybeans (135 bu/acre). However, the bushels per acre and the corn price are varied to show the return to management at different corn yields. The total costs included \$21 for labor per acre of corn. This table also is designed to be read in the same manner as Table 4.

When using Tables 5 and 6, several become evident. Table 6 is based on corn production on land that was previously planted in soybeans so during the next year the return to management will change. The labor cost in Table 5 when considered in a per acre basis is \$600/acre for feeder pig production rather than \$21/acre for corn production. For the self-employed farmer/producer this difference is important. Hay/sod crops needed for outdoor hog production may not generate as much income as corn and soybean crops.

The price that is needed to match the return to management from 1 acre of corn (135 bu/acre) to 1 acre used in the production of feeder pigs is shown in Table 7. Table 7 also shows the percentage of time that corn has been above the price given and the percentage of time that feeder pigs are below the respective price needed to break-even with an acre of corn production. For example, at a corn price of \$2.50 the price of feeder pigs must equal \$37/head to have the equivalent return to management. From Jan. 1980 until Aug. 1996, feeder pig prices were above that amount 71.2% of the time while the price of corn was above that amount (\$2.50) 36.5% of the time. The average corn price from 1980 until Aug. 1996 was \$2.41/bu while feeder pig prices averaged \$44/pig.

Acknowledgments

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Table 1. Facilities and machinery investment for 100 sows.

Item	Size or description	Quantity	Price	Total cost
<u>Gestation</u>				
Sow shelters	12*20 wood sheds	10	\$1,000.00	\$10,000.00
Fencer	A/C powered	1	\$200.00	\$200.00
Wire	14-ga wire	3.5	\$30.00	\$105.00
Insulators	25/bag	6	\$7.00	\$42.00
Wood posts	6-in. posts	10	\$8.00	\$80.00
Steel posts		120	\$2.70	\$324.00
Feeding troughs	12 ft	12	\$50.00	\$600.00
Energy free waterer		1	\$510.00	\$510.00
Water tanks	Cast iron	5	\$240.00	\$1,200.00
Floats and tank connectors	5-yr use	10	\$20.00	\$200.00
Pipe	1 in.	600	\$.30	<u>\$180.00</u>
Total				\$13,441.00
<u>Farrowing/nursery</u>				
	One of the best at reducing			
Modified A frames	pig loss	60	\$130.00	\$7,800.00
Portable sheds	12*20 wooden sheds	10	\$1,000.00	\$10,000.00
Water tanks	Cast iron	10	\$240.00	\$2,400.00
Pipe	1-in. pipe sold by ft	1,000	\$.30	\$300.00
Floats and tank connectors	5 yr use	20	\$20.00	\$400.00
Electronet	150-ft sections	39	\$100.00	\$3,900.00
Wood posts	6-in. posts	18	\$8.00	\$144.00
Self feeders	60 bu	10	\$470.00	<u>\$4,700.00</u>
Total				\$29,644.00
<u>Support supplies</u>				
Hydraulic hog mover	Reduces labor shared with other enterprises	1	\$4,500.00	\$4,500.00
Tractor	Shared	1	\$3,000.00	\$3,000.00
ATV	Shared		\$2,000.00	\$2,000.00
Feed, storage, handling	Includes 2.1 bulk bin	1	\$600.00	<u>\$600.00</u>
Total				\$10,100.00
Overall total				\$53,185.00
Cost per year	10% of total			\$5,318.50
Per sow cost	Divide over all total by 100 sows			\$531.85
Per sow per year	Divide by 10 yr the cost/sow			\$53.19
Per litter cost	Divide the cost/sow/yr by two litters			\$26.59

Table 2. Per litter budget for a two litter outdoor farrow-to-feeder system.

Item	Price	Quantity	Per litter revenue	Per litter expenses
<u>Revenue</u>				
Feeders, 50 lb	\$44.00	7.5	\$330.00	
Non breeders, 400 lb	\$34.00/cwt	.08	\$10.88	
Cull sows, 400 lb	\$34.00/cwt	.20	\$27.20	
Cull boars, 600 lb	\$30.00/cwt	.03	<u>\$5.40</u>	
Total			\$373.48	
<u>Variable costs</u>				
Feed				
Corn, bu*	\$2.50	23.25		\$58.13
Supplement/minerals, lb	\$.18	245		\$44.10
Total feed				\$102.23
Veterinary health	\$15.00	1.00		\$15.00
Replacement gilts	\$175.00	.29		\$50.75
New boars	\$500.00	.03		\$15.00
Marketing	\$13.80	1.00		\$13.80
Bedding	\$15.00	1.00		\$15.00
Repairs	\$5.00	1.00		\$5.00
Power/fuel	\$10.00	1.00		<u>\$10.00</u>
Total				\$226.78
Interest on variable	\$113.39	4.5%		\$5.10
Total variable				\$231.88
Income over variable				\$141.60
Fixed costs				
Facilities				\$26.59
Interest on facilities @ 9%	\$265.93	4.5%		\$11.97
Land/acre	\$110.00	.07		<u>\$7.70</u>
Total fixed costs				\$46.26
Total costs without labor				\$278.13
Labor hr	\$7.00	6.00		\$42.00
Total all costs				\$320.13
Return to management				\$53.35
Return to labor and management				\$95.35
Break-even variable costs	\$25.12			
Break-even total costs	\$36.89			
Break-even total costs, excluding labor	\$31.29			

*1.25 bu of waste corn was taken out for cornstalk grazing.

Table 3. Break-even feeder pig prices (per head) for selected feed costs.

Corn price	Supplement price	Break-even variable price	Break-even total price	Break-even total price, excluding labor
\$1.75	.12	\$21	\$33	\$27
\$2.00	.14	\$22	\$34	\$28
\$2.25	.16	\$24	\$35	\$30
\$2.50	.18	\$25	\$37	\$31
\$2.75	.2	\$27	\$38	\$33
\$3.00	.22	\$28	\$40	\$34
\$3.25	.24	\$30	\$41	\$36
\$3.50	.26	\$31	\$43	\$37
\$3.75	.28	\$32	\$44	\$39
\$4.00	.3	\$34	\$46	\$40
\$4.25	.32	\$35	\$47	\$42
\$4.50	.34	\$37	\$49	\$43
\$4.75	.36	\$38	\$50	\$44
\$5.00	.38	\$40	\$51	\$46

Table 4. Return to management per litter with varying feed and feeder pig prices.

Corn price	Supplement price	Feeder pig price \$/hd							
		\$25	\$30	\$35	\$40	\$45	\$50	\$55	\$60
\$1.75	\$0.12	\$-56	\$-19	\$19	\$56	\$94	\$131	\$169	\$206
\$2.00	\$0.14	\$-67	\$-30	\$8	\$45	\$83	\$120	\$158	\$195
\$2.25	\$0.16	\$-78	\$-41	\$-3	\$34	\$72	\$109	\$147	\$184
\$2.50	\$0.18	\$-89	\$-52	\$-14	\$23	\$61	\$98	\$136	\$173
\$2.75	\$0.20	\$-100	\$-63	\$-25	\$12	\$50	\$87	\$125	\$162
\$3.00	\$0.22	\$-111	\$-74	\$-36	\$1	\$39	\$76	\$114	\$151
\$3.25	\$0.24	\$-122	\$-85	\$-47	\$-10	\$28	\$65	\$103	\$140
\$3.50	\$0.26	\$-133	\$-96	\$-58	\$-21	\$17	\$54	\$92	\$129
\$3.75	\$0.28	\$-144	\$-106	\$-69	\$-31	\$6	\$44	\$81	\$119
\$4.00	\$0.30	\$-155	\$-117	\$-80	\$-42	\$-5	\$33	\$70	\$108
\$4.25	\$0.32	\$-166	\$-128	\$-91	\$-53	\$-16	\$22	\$59	\$97
\$4.50	\$0.34	\$-177	\$-139	\$-102	\$-64	\$-27	\$11	\$48	\$86
\$4.75	\$0.36	\$-188	\$-150	\$-113	\$-75	\$-38	\$-0	\$37	\$75
\$5.00	\$0.38	\$-199	\$-161	\$-124	\$-86	\$-49	\$-11	\$26	\$64

Table 5. Return to management per acre for a two-litter feeder pig pasture system with varying feed and feeder pig prices.

Corn price	Supplement price	Feeder pig price \$/hd							
		\$25	\$30	\$35	\$40	\$45	\$50	\$55	\$60
\$1.75	\$0.12	\$-804	\$-268	\$267	\$803	\$1,339	\$1,874	\$2,410	\$2,946
\$2.00	\$0.14	\$-961	\$-425	\$111	\$646	\$1,182	\$1,718	\$2,254	\$2,789
\$2.25	\$0.16	\$-1,117	\$-582	\$-46	\$490	\$1,026	\$1,561	\$2,097	\$2,633
\$2.50	\$0.18	\$-1,274	\$-738	\$-202	\$333	\$869	\$1,405	\$1,940	\$2,476
\$2.75	\$0.20	\$-1,430	\$-895	\$-359	\$177	\$712	\$1,248	\$1,784	\$2,320
\$3.00	\$0.22	\$-1,587	\$-1,051	\$-516	\$20	\$556	\$1,092	\$1,627	\$2,163
\$3.25	\$0.24	\$-1,744	\$-1,208	\$-672	\$-136	\$399	\$935	\$1,471	\$2,006
\$3.50	\$0.26	\$-1,900	\$-1,364	\$-829	\$-293	\$243	\$778	\$1,314	\$1,850
\$3.75	\$0.28	\$-2,057	\$-1,521	\$-985	\$-450	\$86	\$622	\$1,158	\$1,693
\$4.00	\$0.30	\$-2,213	\$-1,678	\$-1,142	\$-606	\$-70	\$465	\$1,001	\$1,537
\$4.25	\$0.32	\$-2,370	\$-1,834	\$-1,298	\$-763	\$-227	\$309	\$844	\$1,380
\$4.50	\$0.34	\$-2,526	\$-1,991	\$-1,455	\$-919	\$-384	\$152	\$688	\$1,224
\$4.75	\$0.36	\$-2,683	\$-2,147	\$-1,612	\$-1,076	\$-540	\$-4	\$531	\$1,067
\$5.00	\$0.38	\$-2,840	\$-2,304	\$-1,768	\$-1,232	\$-697	\$-161	\$375	\$910

Table 6. Return to management per acre of corn for selected yields and prices.

Corn price	Bu/acre \$75	Feeder pig price \$/hd							
		\$90	\$105	\$120	\$135	\$150	\$165	\$180	\$195
\$1.75	\$-185	\$-159	\$-133	\$-107	\$-80	\$-54	\$-28	\$-2	\$25
\$2.00	\$-167	\$-137	\$-107	\$-77	\$-47	\$-17	\$13	\$43	\$73
\$2.25	\$-148	\$-114	\$-80	\$-47	\$-13	\$21	\$55	\$88	\$122
\$2.50	\$-129	\$-92	\$-54	\$-17	\$21	\$58	\$96	\$133	\$171
\$2.75	\$-110	\$-69	\$-28	\$13	\$55	\$96	\$137	\$178	\$220
\$3.00	\$-92	\$-47	\$-2	\$43	\$88	\$133	\$178	\$223	\$268
\$3.25	\$-73	\$-24	\$25	\$73	\$122	\$171	\$220	\$268	\$317
\$3.50	\$-54	\$-2	\$51	\$103	\$156	\$208	\$261	\$313	\$366
\$3.75	\$-35	\$21	\$77	\$133	\$190	\$246	\$302	\$358	\$415
\$4.00	\$-17	\$43	\$103	\$163	\$223	\$283	\$343	\$403	\$463
\$4.25	\$2	\$66	\$130	\$193	\$257	\$321	\$385	\$448	\$512
\$4.50	\$21	\$88	\$156	\$223	\$291	\$358	\$426	\$493	\$561
\$4.75	\$40	\$111	\$182	\$253	\$325	\$496	\$467	\$538	\$610
\$5.00	\$58	\$133	\$208	\$283	\$358	\$433	\$508	\$583	\$658

Table 7. One acre of feeder pigs (pasture farrowed) compared with 1 acre of 135-bu corn following soybeans for selected feed prices.

Time actual corn price is above listed corn price (%)	Corn price	Break-even feeder pig price for equivalent return to management for 1 acre in hogs compared with 1 acre in 135-bu/acre corn	Percentage of time actual feeder pig prices have been below break-even price needed
90.5	\$1.75	\$32	4.5
85.0	\$2.00	\$34	6.0
62.0	\$2.25	\$35	6.0
36.5	\$2.50	\$37	28.8
18.5	\$2.75	\$39	31.8
13.5	\$3.00	\$41	42.5
2.0	\$3.25	\$42	47.0
2.0	\$3.50	\$44	56.1
1.0	\$3.75	\$46	65.2
1.0	\$4.00	\$48	69.7
0.0	\$4.25	\$49	74.2
0.0	\$4.50	\$51	77.3
0.0	\$4.75	\$53	83.3
0.0	\$5.00	\$55	87.8