Cost of Finishing Pigs in Hoop and Confinement Facilities

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Introduction

Pork production is a dynamic and ever changing industry. Producers are continually evaluating pork production systems, with the goal of improving or maintaining their competitive position. Production systems range from totally enclosed confinement to pasture systems. Although the method of finishing hogs in hoop structures is not necessarily new, it is a system with a renewed focus in the industry. The Iowa State University Rhodes Research Farm is a research site of hoop as well as confinement pork production. The facilities at the Rhodes Farm consist of three hoop structures and one modular confinement unit.

The focus of this study was to evaluate the cost of pork production in a hoop system and provide a comparison to a confinement system. At this time, there have been three groups of pigs finished in each system: winter 97/98, summer 98, and winter 98/99. This document provides a budget showing cost of production. Additionally, through sensitivity analysis, production costs are provided for selected facility investment, feed efficiency, and feed cost levels.

Although this report focuses on the second (summer group) and third (winter group) of pigs that were finished in the facility, the research will eventually contain results from at least five feeding trials over at least a 2-year period and with more than 2500 pigs.

Summer trial. The summer trial was started on June 30, 1998, with the hoops and confinement facility stocked over a 2-week period. All pigs were marketed by November 24, 1998. The stocking of the hoops and confinement was staggered. Prior to starting the grow-finish trial, the pigs were used in a SEW trial for 39 days. At the end of the SEW trial (June 30 for hoops and July 13 for confinement) the head count in each building was reduced to grow-finish capacity for the grow-finish phase. The pigs started the trial weighing approximately 37 lb On June 30, the three hoop buildings contained 451 pigs and on July 13, the confinement facility contained 132 pigs (Table 1a).

Winter trial. The winter trial was started on November 24, 1998. The stocking of the hoops and confinement was staggered over a 3-week period. The first pigs were marketed on April 12, 1999, and all were marketed by May 11, 1999. The pigs started the winter trial weighing about 33 lb on average. The winter pigs were of the same genetics as the summer group and the pigs for both trials were procured from the Lauren Christian Research and Demonstration Farm at Atlantic, IA. The three hoop structures were stocked with 451 pigs and the confinement building was stocked with 132 pigs. Further details and methods used in this trial can be found in (2).

Cost of production. The budgets in this report are based on the productivity information shown in Table 1a and b. Table 1a shows productivity by season. The confinement system creates a growth cycle less affected by seasonal factors; whereas the hoop system shows more variation between seasons. The hoop pigs performed better in the summer versus the winter compared with confinement pigs. Table 1b shows the annual average through combining the summer and winter trials. Each operation and operator are different, therefore, space is provided for your own individual comparisons.

The budgets provided in Table 2a and b are based on a facility cost of $180 per pig space for a confinement building and $55 per pig space for the hoop structure with feed and manure equipment being the same for both systems. The fixed cost is allocated based on the relative average daily gain rates with 10 days added for tail-end pigs and clean out. Fixed costs are calculated at 13.2% of total investment for confinement and 16.5% for hoops. Confinement facilities are depreciated over 15 years (6.7% annually), whereas hoops are depreciated over 10 years (10% annually). Insurance and taxes represent 1.5% of fixed investment. Ten percent interest is assumed for both systems. Fuel, repairs, utilities, vet, medical, marketing, and miscellaneous are based on Iowa State University livestock enterprise budgets (1,3,4). The bedding cost is for 195 lb of cornstalks per pig; with a 1,200 lb bale valued at $20 per bale. Labor was valued at $10/h with .20h/head and .27h/head needed, respectively, for confinement and hoop pigs.

Feed efficiency was 2.96 lb of feed per pound of gain for confinement and 2.79 for hoop pigs in the summer. During the winter, hoop and confinement feed

Table 1a. Seasonal swine grow-finish productivity information.

	Summer			Winter		
Item	**Hoop**	**Conf**	**Diff**	**Hoop**	**Conf**	**Diff**
Overall means						
Number of pigs started	451	132		451	132	
Average start weight	36	38	2	32	34	2
Number of pigs marketed	442	126		426	129	
Average end weight (farm)	260	260	0	262	257	-5
Average days from start to market	117	122	5	148	136	-12
Pounds of feed consumed per lb sold, start to market	2.79	2.96	0.17	3.31	2.99	-0.32
Average weight gain	224	222	-2	230	223	-6

Table 1b. Annual swine grow-finish productivity information.

	Annual		
Item	**Hoop**	**Conf**	**Diff**
Overall means			
Number of pigs started	451	132	
Average start weight	34	36	2
Number of pigs marketed	434	128	
Average end weight (farm)	261	258	-2
Average days from start to market	133	129	-4
Pounds of feed consumed per lb sold, start to market	3.05	2.98	-0.1
Average weight gain	227	223	-4
Feed protein percent and pig weight ranges: 35–63 lb, 22.0%; 63–97 lb, 20.1%; 97–139 lb, 17.7%; 139–190 lb, 16.2%; 190–mkt lb, 14.6%			

conversion was 3.31 and 2.99, respectively. The resulting efficiency difference favors the hoops for overall feed efficiency during the summer months. The results for the winter are reversed, with the confinement having a .32 lb feed conversion advantage. Industry opinion as well as these three feeding trials indicate that feed efficiency for hoop pigs is more adversely affected during the winter. With a feed cost of 6¢ per pound, the resulting feed cost for confinement and hoops are $37.33 and $39.60, respectively (Table 2a), for the summer. The feed efficiency for the winter group was 3.31 lb for the hoops and 2.99 for the confinement pigs. Providing a feed cost for hoops and confinement of $44.88 and $40.54, respectively.

Summer. The total overall cost per hundred pounds live-weight for a 260-lb market pig during the summer was $32.65 for hoops and $34.52 for confinement. Confinement pigs had slightly higher lean carcasses and less variation in weight and therefore received a carcass premium of approximately $0.50 per cwt live-weight over the hoop pigs. The net cost per hundred weight after the premium was $32.15 for hoops and $33.51 for confinement resulting difference represents a $1.36 cost advantage for the hoop system.

Winter. Total overall cost per hundred pounds live-weight for a 260-lb market pig during the winter was $36.48 for hoops and $34.99 for confinement. In the winter as well as the summer, the confinement pigs had slightly higher lean carcasses and less variation in weight and therefore received a carcass premium of approximately $0.50 per cwt live-weight over the hoop pigs. The net cost per hundred weight after adjusting for the premiums was $35.98 for hoops and $33.99 for confinement. The resulting difference represents a $1.99 cost advantage for the confinement system. The winter trial, while higher cost for both groups, favored the confinement system.

Annual. Overall, the confinement system in our study showed a cost advantage of $0.31 per cwt market weight sold (Table 2b). These annualized figures are simple averages of the summer and winter groups. Opportunity

Table 2a. Seasonal swine grow-finish production budget.

	Summer			Winter		
Item	**Hoop**	**Conf**	**Diff**	**Hoop**	**Conf**	**Diff**
Facility Investment						
Building (per pig space) (8 ft^2/pig confinement; 12 ft^2/pig hoop)	$55.00	$180.00	$125.00	$55.00	$180.00	$125.00
Feed & manure handling equipment (per pig space)	$36.00	$36.00		$36.00	$36.00	
Total initial investment (per pig space)	$91.00	$216.00	$125.00	$91.00	$216.00	$125.00
Days from 35–260 lb + 10 days (based on relative average daily gain)	128	134	6	155	147	-8
Total investment per pig marketed	$31.91	$79.30	$47.39	$38.64	$86.99	$48.35
Fixed Cost						
Interest, taxes, depreciation, insurance (13.2% for confinement; 16.5% for hoops) (per cwt, 35 lb to market)	$5.22	$10.31	$5.09	$6.50	$11.40	$4.91
Operating cost						
Feeder pigs (30–40-lb pig)	$30.00	$30.00		$30.00	$30.00	
Interest on feeder pig (10% for 4 months)	$1.00	$1.00		$1.00	$1.00	
Fuel, repairs, utilities	$1.00	$1.50	$0.50	$1.00	$1.50	$0.50
Bedding (1,200-lb bale @ $20.00 each)	$3.25		-$3.25	$3.25		-$3.25
Feed ($.06/lb feed)	$37.33	$39.60	$2.27	$44.88	$40.54	-$4.34
Vet/medical	$1.50	$1.50		$1.50	$1.50	
Marketing/misc.	$1.50	$1.50		$1.50	$1.50	
Interest on fuel, feed, etc. (10% for 2 months)	$0.74	$0.74	-$0.01	$0.87	$0.75	-$0.12
Labor (0.20 h conf; .27 h hoops @$10/h)	$2.70	$2.00	-$0.70	$2.70	$2.00	-$0.70
Death loss cost	$0.61	$1.43	$0.82	$1.76	$0.70	-$1.06
Total operating cost	$79.63	$79.27	-$0.37	$88.46	$79.49	-$8.97
Total cost (per pig marketed)	$84.90	$89.74	$4.84	$94.84	$90.98	$-3.86
Grade Premium (per pig marketed)	$1.30	$2.60	$1.30	$1.30	$2.60	$1.30
Net Cost (per pig marketed)	$83.60	$87.14	$3.54	$93.54	$88.38	-$5.16
Net cost per cwt market weight live (260 lb market hog)	$32.15	$33.51	$1.36	$35.98	$33.99	-$1.99

Table 2b. Annual swine grow-finish production budget.

Item	Annual Hoop	Conf	Diff
Facility Investment			
Building (per pig space) (8 ft^2/pig confinement; 12 ft^2/pig hoop)	$55.00	$180.00	$125.00
Feed & manure handling equipment (per pig space)	$36.00	$36.00	
Total initial investment (per pig space)	$91.00	$216.00	$125.00
Days from 35–260 lb + 10 days (based on relative average daily gain)	142	141	-1
Total investment per pig marketed (based on relative average daily gain +10 days)	$35.28	$83.15	$47.87
Fixed Cost			
Interest, taxes, depreciation, insurance (13.2% for confinement; 16.5% for hoops) (per cwt, 35 lb to market)	$5.82	$10.98	$5.15
Operating cost			
Feeder pigs (30–40-lb pig)	$30.00	$30.00	
Interest on feeder pig (10% for 4 months)	$1.00	$1.00	
Fuel, repairs, utilities	$1.00	$1.50	$0.50
Bedding (1,200-lb bale @ $20.00 each)	$3.25		-$3.25
Feed ($.06/lb feed)	$41.11	$40.07	-$1.03
Vet/medical	$1.50	$1.50	
Marketing/misc.	$1.50	$1.50	
Interest on fuel, feed, etc. (10% for 2 months)	$0.81	$0.74	-$0.06
Labor (0.20 h conf; .27 h hoops @$10/hour)	$2.70	$2.00	-$0.70
Death loss cost	$1.19	$1.06	-$0.12
Total operating cost	$84.05	$79.38	-$4.67
Total cost (per pig marketed)	$89.87	$90.36	$0.49
Grade Premium (per pig marketed)	$1.30	$2.60	$1.30
Net Cost (per pig marketed)	$88.57	$87.76	-$0.81
Net cost per cwt market weight live (260 lb market hog)	$34.07	$33.75	-$0.31

Table 3a. Building investment and feed efficiency sensitivity of production cost per cwt for confinement versus hoop structures during the summer.

	Confinement building investment				
Feed efficiency difference	**$140**	**$160**	**$180**	**$200**	**$220**
0.2	$0.35	$0.74	$1.13	$1.53	$1.92
0	-$0.69	-$0.30	$0.09	$0.48	$0.87
-0.2	-$1.74	-$1.35	-$0.96	-$0.57	-$0.18
-0.4	-$2.79	-$2.40	-$2.00	-$1.61	-$1.22

Overall net cost of confinement over hoops.
A negative number indicates that confinement is lower cost.
Assuming feed cost of $.06 per lb of complete feed.

Table 3b. Building investment and feed cost sensitivity of production cost per cwt for confinement and hoop structures during the summer.

	Confinement building investment				
Feed cost per lb	**$140**	**$160**	**$180**	**$200**	**$220**
0.06	-$1.06	-$0.67	-$0.28	$0.11	$0.50
0.08	-$1.18	-$0.79	-$0.40	-$0.01	$0.38
0.10	-$1.30	-$0.91	-$0.52	-$0.13	$0.26
0.12	-$1.43	-$1.04	-$0.64	-$0.25	$0.14

Overall net cost of confinement over hoops.
A negative number indicates that confinement feeding is less costly.
Assuming 3.05 and 2.98 FE for confinement and hoops, respectively.

cost has been assigned at full value. Some operations may or may not exhibit higher or lower cost for any or all of the inputs. For example, an operator that builds his or her own buildings will probably show more of a relative advantage for the confinement system. A corn grower that bales his or her own bedding and returns it to his or her own land will likely show more of a relative advantage to the hoop system.

Our research, has shown the main cost differences in the two systems to be housing cost, feed, and bedding. Given these three differences, operator preferences, and available resources should guide any system decision. With that said, the next section of this report aims to show how the advantage of each system increase/decreases as feed cost, feed conversion, and building expense are allowed to vary.

Investment, Feed Efficiency, Feed Cost Sensitivity. Items such as facility investment, feed efficiency, feed cost, interest cost, etc., can have a large effect on the overall cost comparison of production systems. Moreover, items such as feed cost can vary considerably from year to year. For these reasons, sensitivity analysis is provided.

Table 3a shows the sensitivity of production cost per cwt to feed conversion and confinement facility investment for pigs finished in the summer. For Table 3a, the feed conversion of confinement is held constant at 2.98 and feed conversion for hoops is allowed to fluctuate. There are many variations in types of facility investment. Although construction costs vary widely for all types of growing systems, the per-pig cost declines with size of the system and as the number of pigs housed at a site increases. For this table, confinement facility expense is allowed to fluctuate from $140 per pig space to $220 per pig space. Table 3a shows that as the feed efficiency difference decreases and confinement construction investment increases, the hoop system becomes relatively more attractive.

Table 3b shows the sensitivity between the cost of complete feed and confinement construction cost for the summer. In Table 3a and b, all other factors were held constant according to those values in the budget (Table 2a and b).

Conclusions

Hoop systems are competitive with confinement systems. In the summer, hoop production seems to be lower cost than confinement. In the winter, confinement production seems to be lower cost than hoops. When the seasonal trials are averaged, the confinement and hoop systems are quite similar; cost of production per cwt was $34.07 in the hoop system, compared to $33.75 for the confinement system. Over the year, confinement hogs showed less seasonal variability. Growth, etc., was more variable in the hoop hogs.

For the summer group, pigs grown in hoops compared with a modern modular confinement building grew slightly faster, required slightly less feed per pound of gain, and produced slightly fatter carcasses. For the winter group, pigs grown in hoops compared with a modern modular confinement building grew slightly slower, required slightly more feed per pound of gain, and produced slightly fatter carcasses. Other differences were not significant.

The three largest cost differences were facility, bedding, and feed costs. Cost structures are different. Confinement systems have higher facility costs, which are fixed costs, and directly related to investment requirements. Hoop systems tend to have higher feed, bedding, etc., costs, or those costs which are operating/variable costs. The economic impacts of shutting down a hoop system are less than similar actions for a confinement system.

Given similar economic results, operator preference and available resources will guide the production decision. Decisions will depend upon such factors as management style, preferences, availability of capital, and availability of bedding. Selected values presented herein may not reflect your operation. They reflect what we have found at the Rhodes Research and Demonstration Farm. Any decision you make should depend on management style, preferences, availability of capital, and availability of bedding. In your evaluation, please revise values to reflect your operation and alternatives.

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