ECONOMICS OF THE PRODUCTION INDUSTRY
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Swine operations of various sizes can be competitive, if effective management and efficient production levels are present. Swine production records have shown that the top 20 percent of Iowaí s producers have some partial cost advantage over the large-unit producers and that the top 30-40 percent of Iowa producers are cost competitive.

There will be a place for small-scale producers in the future, but studies suggest smaller operations with 100 or fewer sows will face competitors that have strong economic advantages. Adjustments will be needed for these producers to remain competitive. Networking to gain some advantages can improve their competitive position. Additionally, they may be able to effectively exploit some of the complimenting relationships of a diversified livestock/crop enterprise/production mix.

Costs and Returns by Size

Cost comparisons between Iowa producers and some of the large integrated operations in the United States are shown in Table 1.

Table 1. Comparison of Top 10 and 1/3 of Iowa Swine Enterprise Record System Producers with Large Operators - Farrow to Finish (1995)

Factor	Iowa Producers			Mega Operations
	Top 10%	Top 1/3	Average	
Feed cost/cwt.	$22.23	$23.48	$25.29	$24.74
Fixed cost/cwt.	$2.57	$3.08	$3.99	N/A
Total cost/cwt.	$33.06	$36.07	$40.53	$39.67
Feed efficiency	3.37	3.45	3.61	3.15
Diet cost/cwt.	$6.63	$6.83	$7.02	$7.86
Litters/sow/yr.	2.02	1.97	1.90	2.31
Pigs/sow/yr.	20.50	19.68	18.71	23.47
Death loss, %	16.67%	17.37%	18.17%	15.76%

The top one-third in Iowa had a $3.60 advantage in total cost per hundred pounds of liveweight hogs produced, compared with the mega producer. The top one-third of Iowa producers also had a feed cost advantage of $1.26/cwt over the large producers. The mega producer had a cost advantage of 86 cents over the average Iowa producer. This shows that competitive production costs can be achieved by various sizes of operations.

The top 10 percent of Iowa herds averages about 165 sows. Size is not the dominant driver in remaining competitive. Further analysis showed that the top one-third of producers in the ISU Swine Enterprise Record System had a $9/cwt cost advantage over the low one-third, or about $22 per hog.

Feed efficiency for the top 10 percent in Iowa was 3.37 as compared to 3.15 for the mega producer; 3.61 for the Iowa average. Litters per sow per year were 2.02 for the top 10 percent in Iowa compared to 2.31 for the large producer. The large producer was getting about three more pigs farrowed live per sow per year. However, their diet cost was about $1.00 per hundred weight higher.

A Purdue University study used a budgeting model to evaluate production costs for pig production systems ranging from a 150 sow low-technology system to a 1,200 sow high-technology system. Production efficiencies such as farrowings per sow per year, pigs weaned per litter, feed efficiency, mortality, etc., improved as operation size increased.

The 1,200 sow system represents production under close to ideal conditions. For example, farrowing per sow per year was 2.24 for the 1,200 sow operation as compared to 1.92 for the 150 sow low technology operation. Pigs weaned per litter were 9.5 as compared to 8.5; market hogs per litter 9.025 versus 7.905; days to market 155 versus 198; and a feed efficiency of 3.0 versus 3.5. Thus, results do not depict production cost comparisons between systems with similar production efficiencies.

Results show that the budgets projected production costs to decline as operation size increased. For example, production costs for the 600 sow operation was $4.38 per hundredweight live pork above the 1,200 sow operation, while the 150 sow high and low technology systems were $6.29 and $13.63 higher, respectively.

The primary difference in cost for the different size and technology comparisons was in the indirect cost area. Labor and equipment costs represented a majority of the difference. For example, in the comparison of the 1,200 vs. 150 sow high technology system, the difference in labor and equipment costs per hundredweight of pork was $4.85 or 77 percent of the $6.29 difference. Equipment costs are spread over more pigs in the larger system. Equipment investment per litter capacity was $481 for the 1,200 sow operation as compared to $973 for the 150 sow low technology operation.

A Minnesota study evaluated several systems of well-managed farrow-to-finish operations for two different operation sizes: a 120-sow and a 505-sow operation. The baseline is an environmentally controlled total confinement/production facility. In general, return to management and risk was about $4 to $5 per hundredweight lower for the small operation compared with the large operation with similar technology.

The above studies focused on specialized pig production systems. However, on many farming operations, both livestock and crops are produced. An Iowa State study has shown that incorporating pig production can improve the earnings level for a crop production operation.

For operations achieving medium crop yields, adding a 120-sow operation to 400 acres of continuous corn increases annual return to management from $6,711 to $31,532 (Table 2). The return increased to $39,320 with a corn-soybean rotation. This compares with $16,777 for 1,000 acres of corn/soybeans without swine. Efficient pork production can effectively increase income and provide an alternative for marketing corn.

Table 2. Return to Management for Various Crop and Livestock Scenarios

	Low-yield	**Med.-yield**	**High-yield**
400 acres-corn/soybeans	($1,616)	$6,711	$11,844
1,000 acres-corn/soybeans	(1,410)	16,777	29,609
400 acres-continuous corn w/ 120 sows	24,035	31,532	35,885
400 acres-corn/soybeans w/ 120 sows	29,283	39,320	44,668

Costs and Returns by System

Swine production occurs in many varied types of systems or facilities. These range from a pasture facility where pigs have little or no shelter and can move throughout a field, to one where pigs are totally confined. Management, facility and equipment needs, labor and ration needs vary between systems.

For example, pasture systems have low capital requirements, while total confinement has high capital requirements. In comparison, confinement has greater control of the pigsí environment, allowing for improved feed efficiency. A key to success is that, while differing types of management is needed, efficient and effective management is needed for each system.

A recent study compared production costs between a confinement system and a hoop structure system for finishing hogs. Net cost per hundredweight live pork was projected at $41.35 for a confinement system and $41.73 for a hoop structure system. While hoop systems had lower investment costs, confinement systems had lower feed costs per hundredweight pork produced.

Alternative production systems such as pasture production and hoop structure can enhance farm income. They also offer greater flexibility to enter and exit production because of their lower initial investment. These systems trade increased labor for reduced capital and typically require greater stockmanship skills.

Costs and Returns by Technology

The swine industry is dynamic and undergoing continuing evaluation of production technology and adjustments. These technologies impact pork productions as well as revenues. Examples of technologies include segregated early weaning (SEW), all-in/all-out (AIAO), advanced genetics associated with lean pork, split sex or phase feeding, and the amount of facility throughput.

A recent study conducted at Purdue University examined these technologies, showing their economic impact on the costs and revenues of pork production (Table 3). The base is the 150-sow low-technology system. Most value calculations represent cost efficiencies. Some, such as ì Genetics -

The technology that provides the highest or greatest impact per hundredweight of pork produced was SEW/AIAO production technology; an impact of $4.73 per hundredweight of pork produced. SEW/AIAO technology has a potential to enhance the health of the nursery and the grow-finisher pig. While this technology has the potential for large economic gain, it also can be difficult to adopt. Major modifications at a high capital cost may be needed to successfully implement the technology.

Improved genetics occupies the number two as well as number four position in terms of economic impact on pork production. The impact of genetics on production efficiency provides a $3.38 per hundredweight impact. This would include improvements in number weaned and litter size, along with feed efficiency and weaning weights. The genetic impact on the revenue side, such as the value of leaner hogs, was projected at $2.24 per hundredweight. If the cost as well as revenue side of improved genetics was combined, it would take over the number one position, with an impact of $5.62 per hundredweight.

The importance of throughput, or movement of animals through the operation in an effective manner, is shown by its number three ranking, or the value of $3.09 per hundredweight of pork produced. The impact here is that as more animals are moved through a particular production system, fixed costs per animal decline.

In the comparison, the number of hogs produced annually per thousand dollars of building and equipment investment increased from 5.5 to 10.18. This result shows the importance of spreading fixed cost over more units of output. Split sex/phase feeding has been projected to provide an economic impact of about $1.80 per hundredweight of pork produced.

All-in/all-out production by itself has been projected to provide about a $.75 impact per hundredweight of pork produced. Thus, while split sex/phase feeding and all-in/all-out production are ranked numbers five and six in terms of economic impact, they are ranked numbers one and two in ease of adoption. With both of these technologies, it may be a matter of some remodeling of existing facilities to allow the pigs to be sorted by sex, as well as movement of pigs into a particular room or facility and back out on a group basis.

Most of these technologies are not necessarily size specific. Depending on the approach used and the potential for producers to work together, these technologies can be effectively implemented across many different sizes of operations. Efficient retrofitting of existing facilities may gain many of the efficiencies. Construction of new facilities is another alternative. The bottom line is the development of a system that is effectively tied together.

Table 3. Returns for Swine Production Technologies

Rank	Technology	Impact $/cwt	Impact $/head	Ease of Adoption
1	SEW/AIAO	4.73	11.59	7
2	Genetics-Production	3.38	8.28	3
3	Throughput	3.09	7.57	8
4	Genetics-Revenue	2.24	5.48	4
5	Split Sex/Phase Feeding	1.79	4.39	1
6	All-In/All-Out	.73	1.79	2
7	Network Selling	.75	1.83	5
8	Network Buying	.70	1.72	6

Source: *Positioning Your Pork Operation for the 21st Century*, Purdue University, 1995.

Economics of an Integrated Industry

Vertical and horizontal coordination activities in the pork production industry have been expanding over time. For example, in pork production, vertical coordination ties production to genetics and other inputs on one end of the industry through to processing/retailing at the other end.

Traditionally, the pork industry has been coordinated by open market price signals. However, new models are emerging. These coordination methods can range from those systems integrated by ownership across all the industry segments, to other methods which are coordinated through the use of formal or informal contracts or arrangements between the independent firms in the industry. Some of these arrangements may be highly structured, while others may be quite informal in nature. In general, the coordinated efforts are aimed at improving the competitive position for the participants of the industry.

Increased coordination, alliance, or networking vertically or horizontally between producers can lead to improved efficiencies in industry performance. Effective coordination systems can more quickly respond to changing price signals and consumer demands. It creates an active participation by all industry stakeholders. Coordinated systems which are operated effectively have been shown to provide those components necessary for success in the industry.

These components include management of the firm, information availability, availability and quality of resources, and market development. Moreover, coordination allows the participants to remain in the industry, and focus on that area of the industry in which they have the highest competitive advantage. For example, some participants may focus on feeder pig production, while others focus on finishing feeder pigs, and still others focus on producing the feed inputs necessary for pork production.

Recent studies have shown economic efficiencies to coordinated efforts in swine production. One study showed that pigs produced in systems where there are contractual arrangements typically have better feed and labor efficiency than pigs produced in operations which were totally independent. Coordinated efforts can also lead to advantages of volume buying and selling.

Coordinated industry efforts can lead to improvements in the access to information as well as its quality. It can also include better information feedback through the industry channels about attributes that influence consumer purchases and the attribute values. Coordination efforts can then tie together the genetic base, rations, capital, etc., that are necessary to produce products that meet these consumer preferences.

Effective coordinated systems can improve the flow of information as well as the ability to access the inputs needed to produce products which consumers demand. With the increased movement toward industry coordination and market hog price establishment, cash market hog prices represent a declining share of market hogs. These prices may not reflect overall industry prices.

A key to successful coordinated systems would be to improve the competitive position of the industry participants. This can be impacted by concentration of power within the industry. For effective coordination and sharing of benefits, power should be spread across the industry.

Production and Return Variability

Production performance can vary significantly between producers in a particular year. For example, in 1995 the average annual percent return on capital for the top 10 percent of operations in the Iowa Swine Enterprise Record Program was about 55 percent. This compared to 23 percent for the average farm and about 8 percent for the bottom third. This is a rather striking difference and shows the importance of keeping production efficiency at a competitive level. The bottom line is that those operations that had high returns also had high productivity.