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"Changes in production technology, disease control, and genetics have contributed to the concentration of the swine industry."

"Today, 55% of all hogs produced in the U.S. are produced on farms with more than 2,000 animals and 35% of all hogs are on farms with 5,000 or more hogs."

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COOPERATIVE EXTENSION
BUILDING a new foundation

Swine Industry Economics

By Jennifer Grannis and Andrew Seidl[1][2]

"Predicting is tough…especially when you are talking about the future."
Yogi Berra (?)

Industry Profile: Past, Present and Future

Until two decades ago, the hog industry was highly concentrated in the upper-Midwest. In the 1980s the industry began to change, and nontraditional hog states became important producers of pigs[3]. Most notably, North Carolina went from the bottom of the list of hog producers to second behind Iowa. Because it was cheaper to feed a pig closer to the feed center, places like North Carolina had not been able to compete with corn belt states. However, changes in technology, disease control, concentration on genetics, and improved control of feed rations contributed to the ability of nontraditional hog states to compete.

A change in consumer demand may be partially responsible for the change in the hog industry. Starting in the late 1970s, pork and beef lost market share to chicken, potentially due to consumer perceptions of their health attributes. Changed preferences pressured producers to produce a leaner hog. Producers could grow a hog predisposed to be leaner, and feed them a ration that allowed the market hog to develop less fat. Feeding a specialized ration is more expensive than traditional feed practices, but a farmer feeding a large number of hogs could reduce costs by taking advantage of volume discounts. Feeding genetically similar hogs also assured the farmer that weight gains would be the same across the entire group of animals. Less variation in market hogs meant lower costs for the packer, and thus the lean, mass produced hog received premiums at the packing plant.

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[2] This document was originally released as a working paper in the Colorado State University-Cooperative Extension series entitled CAFO Info, September, 1998.

[3] A glossary of terms is included as an appendix to this document.

Today, 55% of all hogs produced in the U.S. are produced on farms with more than 2,000 animals and 35% of all hogs are on farms with 5,000 or more hogs. Colorado's pig production increased 24% from 1996 to 1997 to about 700,000 hogs, but the number of farms producing pigs has decreased. Colorado mirrors the national trend of moving from a state where pigs are produced part-time to where the hog farming industry is concentrated.

Larger facilities are often, but not always, more efficient. Arguably, the margin for error among smaller volume producers is substantially smaller. An Iowa State University study showed that some small volume producers were able to compete on a cost efficiency basis with larger volume producers and that some larger producers were less efficient than smaller volume producers. Top producers have lower death losses and are producing more than 20 pigs for market per sow-year on 2.3 litters per sow. The national average is about 8.6 pigs surviving per litter.

Currently the broiler industry is the most concentrated animal agricultural industry. At one time, growing broilers was not unlike the pork industry. Small, part time chicken farmers produced birds for home consumption and then sold the remainder in a relatively open market. Today, the broiler industry is almost completely vertically integrated. All aspects of production from the breeding inventory to the packing and distribution of a product are controlled by a single corporation in a vertically integrated industry. The broiler industry is controlled from top to bottom by a small number of processors. As fewer farms produce hogs, and those in business maintain ownership of pigs throughout their growth stages through the use of contracting, the likelihood of a similar situation occurring in the pork industry increases. Table 1 illustrates the characteristics of a locale more likely to attract hog operations based upon a study conducted at the Pennsylvania State University.

Table 1: Characteristics of locales attracting hog operations

Attractive characteristics	Current Situation in Colorado
Drier climate	Eastern Plains are dry (rainfalls less than 20 inches)
Existing larger swine facilities	National Hog Farms, 17,000 sows; Seaboard Corp., 20,000 sows; D&D Farms, 20,000 sows; Alliance Farms, 20,000 sows; Midwest Farms, 20,000 sows; Bell Farms, 40,000 sows, all in Eastern Plains.
Larger populations of rural people	No metropolitan centers in the eastern counties
Local governments have less authority to regulate animal facilities	Many local governments had no zoning or planning prior to concentration
Lenient to environmental law violators	Current law is water quality & complaint-based.
Exempt agriculture from local zoning ordinances	Few local zoning ordinances developed before the migration.

Market Structure: Specialization, vertical integration and contracts

Traditionally, all phases of hog production were located within the same operation. Changes in production and managerial technology, and decreases in transportation costs have facilitated the specialization of the hog industry into three distinct phases: farrow, nursery and finish. Specialization has facilitated a transition from an open market dominated industry to one where contracts are used. Contracts are important across all components of the hog operation. It is most common for the breeding stock to be wholly owned by the breeding or farrowing unit, and to contract with nurseries and growers or finishers to feed the hogs to market weight (250 lbs.). The contracted farms are paid a fee and premium that usually depends on weight gain. Selling the market hog and the price received is often determined long in advance by a contract between the hog's owner and the packer, increasing industry efficiency and stability.

One of the criticisms of vertical integration is that it reduces open market activities. If hogs are produced and prepared to the specifications of a processor and sold, not by the grower but by the contract owner, then there is little opportunity for the small producer to enter the market independently and be competitive. Noncontracted producers face challenges in discovering fair market prices and, therefore, difficulties in evaluating contracting opportunities (Table 2).

Table 2: Potential costs and benefits of vertical integration and production contracts

Potential benefits of contracting	Potential costs of contracting
Guaranteed uniform input supply	Failure to produce to standards results in loss of premium
Products of specific quality	Non-renewal or termination of contracts
Introduction of new production technology	Liability of processors to producers
Reduction of overall farm risks	Farmer's loss of independence
Production cost control	Loss of control of farming enterprise
Gains in market share	Monopoly power gained by processors

Contracting is common in the United States. However, Iowa, for example, does not favor contracting as a production tool. The larger an operation is, the more sensible it is for them to concentrate on one phase of production and have other farmers complete the raising of the pig. Most contracts are owned by the concentrated sow operation that has arranged to have their pigs fed to market weight by other farmers. This contract arrangement is not the rule, however, since networks where ownership is partial or changes as the animal changes hands are also possible. Feed producers who own pigs are another group using hog producer contracts to guarantee them a market for their feed.

Production Costs

Because of recent low prices for hogs, averaging about $32-$35/cwt, nationally, and an estimated production cost of about $40/cwt, some producers may go out of business. Some small, higher cost farmers have benefitted from the establishment of new hog farms. Large farrowing operations (>1,200 sows) have contracted with neighbors to provide nursery services (weaning to 50 lbs.) and growing and finishing services. Anecdotal evidence in Minnesota showed some farmers, who otherwise would have given up farming, were able to switch from their labor intensive farrowing operations to relatively less time consuming contracted finishing operations. About 2/3 of the cost of producing a market hog (farrow-to-finish) is feed. About 10% of farrowing and nursery pig production is feed, while about 80% of finishing operation costs is feed. Concerns have been voiced that the contracted hog feeder no longer owns hogs, and thus does not have as large an income or as meaningful a job. However, they also are not bearing the majority of the risk any longer.

Outdoor "hoop structure" operations provide a lower capital cost alternative to the highly capitalized indoor concentrated facilities. One estimate from Colorado is $850 per sow space in indoor facilities versus $300 per sow space in outdoor facilities. Hoop facilities have higher labor costs per sow due to increased monitoring needs. Since they are largely outdoor facilities, weather plays a greater role in productivity and profitability of these operations. These facilities tend to have higher death losses per litter and lower efficiency in feed conversion, but have lower animal densities (greater land requirements) and waste management costs as a result. Wastes are left on the land to decompose naturally. Swine are moved from area to area in order to gain the fertilizing benefits of manure and to allow vegetation of regenerate. However, environmental information (e.g. odor, leaching, runoff) was not available regarding these facilities. Studies from Iowa State University argue for the potential for these hoop structure operations to successfully compete with indoor facilities.

Since corn is the most common ingredient in swine feed, the more expensive corn is the more costly it is to feed a pig. The lower the corn prices, the less expensive it is to feed a pig and the more incentive a farmer has to put pigs on feed. Since feeding a pig is a value-added way to increase profits for the farmer, they are motivated to increase or decrease swine production based on the prices of corn. To explain this relationship, and to aid in the projection of possible changes in the market in the future, the hog/corn price ratio was developed (Table 3).

Table 3: Annual hog corn price ratios

Year	Ratio	Year	Ratio
1990	23.6	1994	16.4
1991	20.7	1995	16.4
1992	20.3	1996	14.4
1993	20.5	1997	15.5

The ratio uses the price of corn and the market price per hundred weight in the expression. The price of swine per hundredweight divided by the price of corn per bushel gives a unitless indicator of the overall strength of the hog market. A high corn price ratio indicates that the price of corn is cheap relative to the price of market hogs. A lag of one year is expected before more hogs reach market as farmers increase breeding stock, breeding, and the number of swine that they are raising for market. As the number of hogs reaching the market increases a reduction in the hog/corn price ratio occurs. More pigs at market means the prices are reduced for hogs. As the top of the ratio goes down and the price of corn remains the same or rises, the overall ratio will be reduced. A low ratio signals that prices for hogs are low compared to the price of corn and fewer hogs will be placed on feed, reducing the number of market hogs.

Conclusions

The swine industry has become increasingly cost competitive, uniform, specialized and vertically integrated over the past decade. From an industry perspective, Colorado has been among the beneficiaries of this specialization, low transportation costs and low corn prices as it has become a low cost alternative for farrowing operations. The swine industry shows many parallels with the poultry industry and features several of the same principal players, making more concentration of the industry appear likely. While the world outlook for the swine industry looks optimistic, producer margins are getting progressively thinner in the pork as a commodity market. Opportunities for cost savings, value-added products and niche markets should be aggressively pursued by producers hoping to increase returns to their labors.

Where You Can Go

1. National Pork Producers Council publications on the Pork Industry. Various fact sheets that are available on the worldwide web. Provides an industry viewpoint of the basics of the pork market. Statistics in this packet are summarized from National Agricultural Statistics Service (NASS) and the USDA.

2. "Industrialization of Agriculture: What Are the Consequences?" By Michael Boehlje from the Purdue University Department of Agricultural Economics. Dr. Boehlje's paper explains the changes in agriculture in a business format. As agriculture industrializes lessons from other industries are applied to help understand the changes.

3. "Pork Industry Price Discovery: A Look Ahead." By David Kenyon at the Virginia Tech Department of Agricultural Economics. Though technical in some places, this book chapter explains some of the major changes

in the hog industry, including the change from Live Weight futures contracts to a carcass weight contract. Dr. Kenyon discusses the difficulties of non-contracted farmers in receiving or determining fair market prices with the reduction in the number of open markets.

4. "Investment under Uncertainty and Dynamic Adjustment in the Finnish Pork Industry." By Kyosti Pietola and Robert Myers. Though very technical, the paper does make the conclusion that the Finnish hog industry, a strong European competitor to the continental leader in pork production, Denmark, are expanding their operations through contracting and increased concentration to the boundaries set by environmental law.

5. "Swine Production Networks in Minnesota: Resources for Decision Making." By Bob Koehler, Bill Lazarus and Brian Buhr at the University of Minnesota. Provides a sketch of opportunities of small farmers to benefit from some of the large scale improvements in production usually thought only accessible to CAFOs.

6. "Contract Hog Production: An Economic Evaluation." By Michael Langemeier at Cooperative Extension Service Kansas State University. Information about costs, returns and appropriate returns to contracting across various stages of pork production.

7. "Iowa's Pork Industry--Dollars and Scents." By various authors at Iowa State University. Provides a nice overview of many of the issues and challenges encountered in the hog industry. First published January 1998.

Appendix 1: Glossary of terms

Barrow	A neutered male pig. Barrows eat more feed and gain weight faster than gilts, making split-sexed feeding appropriate
Boar	An unneutered male hog. Boars have greater weight gain and less backfat than gilts and barrows.
Feeder Hog	A pig greater than fifty pounds of weight that has not yet reached market weight
Feed Ration	What a pig is fed. Ration includes all protein, energy and supplements rolled into one.
Finishing	A stage in the pigs life where they are fed to market weight (240-260 lbs.). However, due to the introduction of phase feeding and split-sex feeding the distinction between feeder and finishing animals has been blurred. Today the phrases are almost interchangeable.
Hog	A big pig. There is no true distinction between a pig and a hog, except that hog usually refers to swine weighing more than fifty pounds.
Gilt	A female hog that has not been bred. She is a gilt until after her first litter is delivered. Gilts have different weight gain patterns than barrows or boars, and split sexed feeding capitalizes on their leanness, higher weight gain and better feed conversion.
Litter	A group of pigs born from the same sow. Current national averages for the number of pigs per litter per sow weaned is 8.6. Concentrated operations can have numbers over ten for their sows.
Market Hog	A hog that has reached a market weight of 240-260 pounds. These weights tend to vary over time according to retail demand. Currently a 250 lb. market hog will yield a 184 pound carcass of which 76% of that is a retail cut.

Nursery Pig A weaned pig weighing less than fifty pounds.

Pig See "hog."

Sow A female pig that has produced at least one litter of pigs. Sows are fed different feed rations depending on whether they are gestating (pregnant), lactating (nursing young) or being prepared for breeding. Sows eat more than other swine and, as the production unit of the industry, are very valuable.

Segregated Early Weaning A process by which pigs are weaned at a very young age. Some experiments and operations can wean pigs and feed them successfully to market weight when weaned at 5 days