Industrialization in hog production: Implications for Midwest agriculture

Gary L. Benjamin

The five states of the Seventh Federal Reserve District have dominated U.S. hog production for decades.[1] Iowa, Illinois, and Indiana rank among the top five states in terms of the number of hogs on farms, and District states have accounted for 48 percent of the roughly $11 billion in annual hog sales over the last five years. In line with this dominance, hogs are a major component of Midwest agriculture. Sales of all farm commodities in District states have approximated $32 billion annually over the last five years. Roughly one of every six of those dollars were generated by hogs. Only two commodities—corn and soybeans—generated more sales than hogs in District states (figure 1).

District states' dominance in pork production has prevailed through a long history of structural change that parallels most components of U.S. agriculture. That history reflects a steep decline in the number of farms that raise hogs and a corresponding increase in the average size of those farms still in business. The structural change continues and at an accelerated pace. The latest phase of this structural change, labeled the *industrialization* of hog production, has been characterized by the expanding presence of very large, highly integrated pork producers, which now account for a sizable share of the industry. Other regions have proven more attractive to these so-called mega farms, causing a decline in the District states' share of hog production in recent years. Because of some divisive issues that have surfaced with the large operations, there are fears that the Midwest's role in hog production will continue to decline in the years ahead. The concern is magnified because a decline in Midwest hog production would likely be accompanied by a decline in the area's related food processing activities. Moreover, a decline in Midwest hog production would also weaken local markets for the District's key corn and soybean crops. Countering these concerns, however, others argue that the social and environmental problems associated with mega producers are too great to blindly pursue this economic activity for the Midwest.

Irrespective of these polar views, it is clear that mega producers have ushered in a new era for Midwest agriculture. This new era will likely recast the characteristics of production agriculture in the Midwest. It will also require balancing the growing environmental concerns associated with concentrated animal agriculture (especially in rural areas where the nonfarm population is growing) with the desire to maintain a competitive regional niche for an industry that is of significant economic importance.

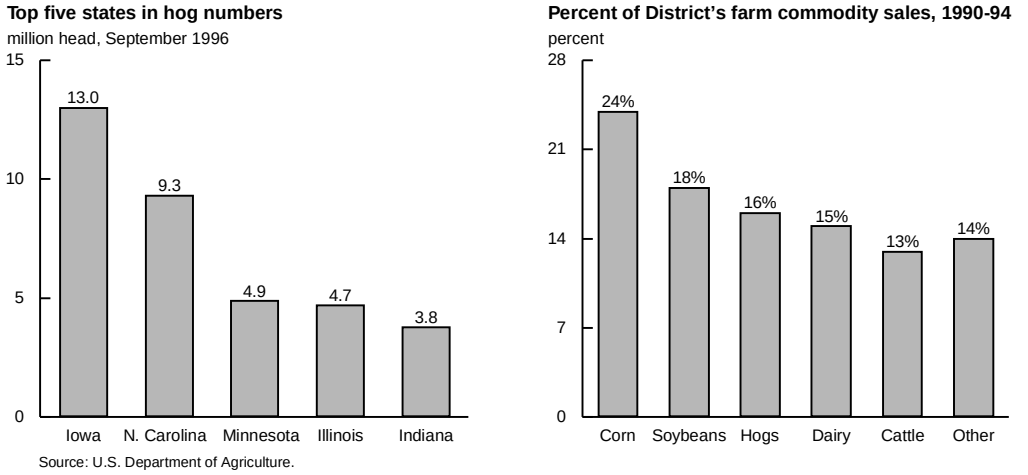
The market for U.S. hogs

An overview of the market for U.S. hogs helps to identify the economic forces influencing the industrialization in hog production. Historically, the market was characterized by very slow growth, with the output of U.S. hog farmers—supplemented by modest net imports—going entirely to domestic consumers. But in

Gary L. Benjamin is an economic adviser and vice president of the Federal Reserve Bank of Chicago.

FIGURE 1

District states lead in hog production

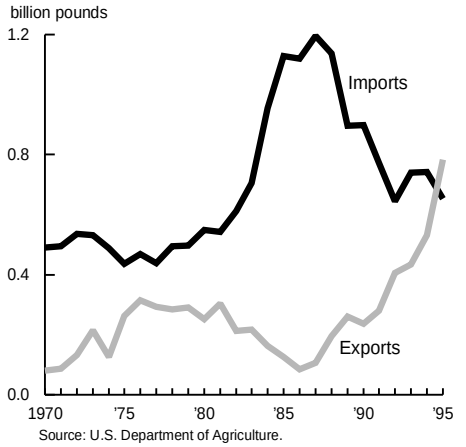


Source: U.S. Department of Agriculture.

terms of recent and prospective trends, there is considerable optimism about the potential for pork exports. This optimism has been reinforced by the recent trend in pork exports and the North American Free Trade Agreement and General Agreement on Tariffs and Trade signings. Indeed, a portion of the recent growth of mega producers has been geared to the export market. Since the mid-1980s, U.S. pork exports have risen sharply while pork imports have declined. In 1995, for the first time in 40 years, the U.S. became a net exporter of pork (figure 2). However, the net exports absorbed less than 1 percent of U.S. pork production last year. Moreover, the U.S. remains a net importer of live hogs. Net hog imports soared in 1995 and were equivalent to nearly 2 percent of the hogs processed in domestic packing plants, well above the normal share.

FIGURE 2

U.S. pork trade



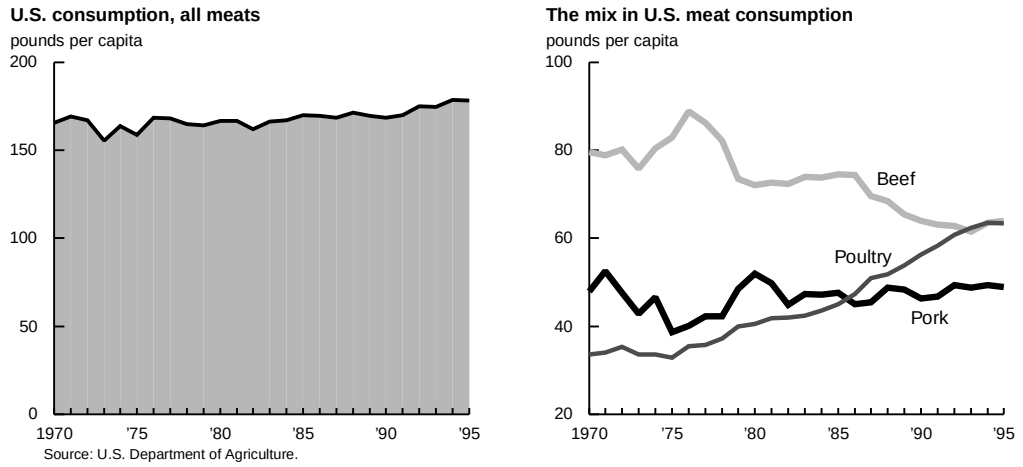
Source: U.S. Department of Agriculture.

The domestic market still absorbs the bulk of all hogs raised in the U.S. The domestic pork market has recorded only nominal growth over the years despite declining real (inflation-adjusted) prices. Per capita consumption of all meats has trended slowly upward, rising about half a percentage point each year. But the mix in domestic meat consumption continues to shift, encompassing strong gains in poultry, a downturn in beef, and a relatively flat trend for pork (figure 3).

While demand for U.S. hogs has grown very slowly over the years, productivity gains have added significantly to supplies. The growing share of production from mega producers has probably accelerated the productivity gains. The continuing gains reflect a combination of technological advances in disease control, genetics, and management practices in the feeding and raising of hogs. The gains have led to more efficient use of the breeding herd, resulting in more litters per sow per year. Moreover, producers now wean more pigs per litter. In 1995, the average number of pigs weaned per litter reached 8.3, up nearly 8.5 percent from the average of ten years earlier.[2] In addition, more efficient feed conversion ratios permit producers to raise pigs to market weight faster than was the case a few years ago. And at the packing plant, live weights and dressing yields have

FIGURE 3

The domestic market for U.S. hogs



Source: U.S. Department of Agriculture.

edged up over time, generating more pork for every hog shipped to market.

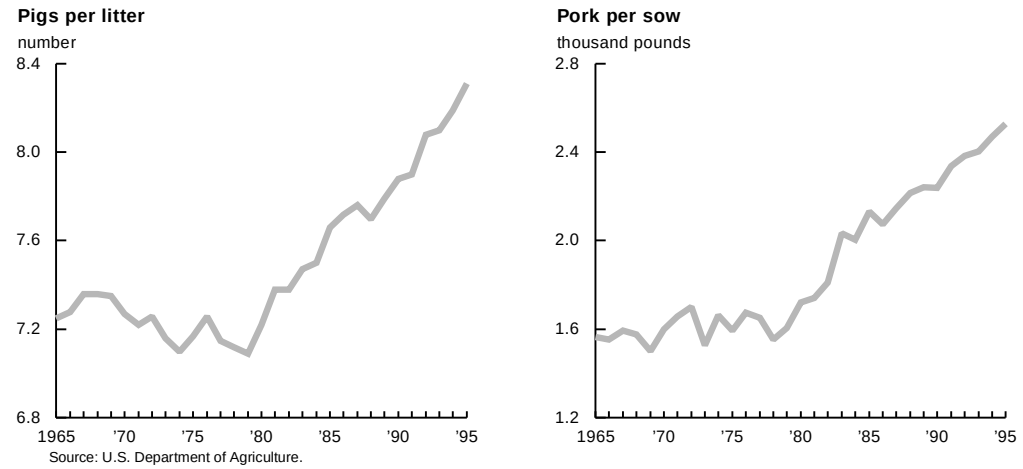
Due to the sustained gains in productivity, the ratio of annual pork production per head of breeding stock has trended steadily upward over the years. In 1995, this ratio exceeded 2,500 pounds (carcass weight basis), up nearly 60 percent from the annual average during the late 1970s (figure 4). As a result of the productivity gains, hog farmers today can produce the same amount of pork as in 1980—the peak year for per capita pork production—using less labor, less feed, and an inventory of 20 percent fewer hogs.

Because of limited growth in demand for pork and continuing gains in productivity, the inventory of hogs on farms, irrespective of cyclical swings, has not changed much over the years. The inventory stood at 58.2 million head in December of 1995, up somewhat from the cyclical lows of 10 and 20 years earlier but still short of the cyclical highs of the early 1970s and the early 1980s (figure 5).

With little growth in market demand and with real hog and pork prices trending downward, the highly cyclical returns to assets used in raising hogs have often proved disappointing to farmers, despite the reputation of hogs as the

FIGURE 4

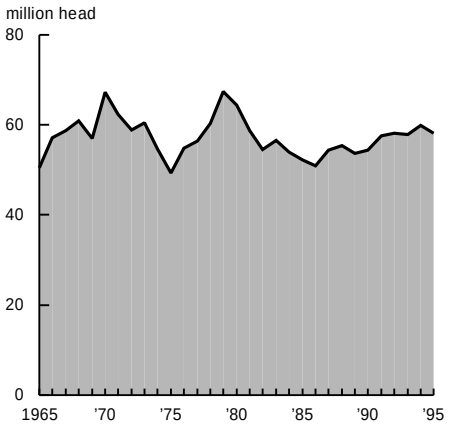
Productivity gains have added to pork supplies



Source: U.S. Department of Agriculture.

FIGURE 5

Little change in U.S. hog numbers



Source: U.S. Department of Agriculture.

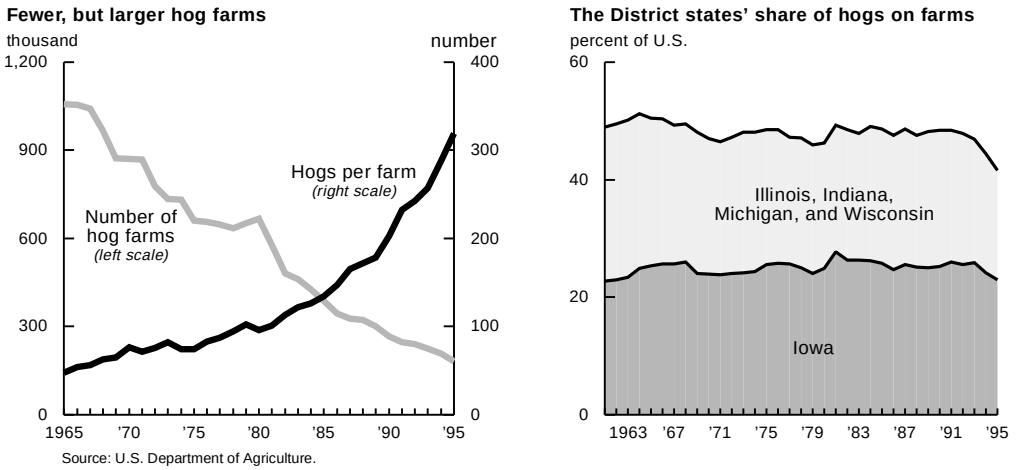
"mortgage lifter." Low returns to capital and labor have pushed many farmers out of the hog business and prompted others to expand in order to achieve lower costs per unit of production. These conditions account for the long-prevailing downtrend in the number of hog farms and the simultaneous rise in their average size. As incredible as it may seem, the number of U.S. farms with hogs shrinks by one-third every five years. (Many of these farms continue to operate but are no longer involved in hog production.) Looking at the last 10 years, the decline in the number of hog farms (206,000) exceeds the number of hog farms in operation today (183,000). With the same economic forces driving the industrialization phenomenon, these trends will no doubt continue, and possibly at an accelerated pace. The rate of increase in the average size of hog farms has picked up in recent years with the arrival of the mega producers. And along with this recent trend, the District states' share of hogs on farms has retreated to levels not experienced since at least the early l960s. That share stood at 41.6 percent as of December 1995, down from 48.5 just four years earlier (figure 6).

Other areas attracting the larger farms

The data available for making regional comparisons of the industrialization in hog production are somewhat limited. Although the industrialization has roots in the 1980s, the most evident changes have occurred in the 1990s. The most current data are provided in quarterly reports by the U.S. Department of Agriculture (USDA). However, these data are highly aggregated and, for the most part, only available for the 16 major hog-raising states.[3] As noted below, several minor states have attracted many of the new mega producers. Moreover, because of the cannibalization that can occur when large producers take over from small producers, these data do not fully capture the regional differences that might be occurring even within the more traditional states. On the other hand, the more detailed Agricultural Census data, which provide more refined farm size comparisons for all states broken down to the county level, are too dated (1992) to be

FIGURE 6

The long-term trends



Source: U.S. Department of Agriculture.

of much help in portraying the latest developments from the recent industrialization phenomenon. The following discussion is therefore based on the most current USDA data.

Among the major hog-raising states, the industrialization phenomenon has been especially apparent in North Carolina and, to a lesser extent, Missouri. Reflecting this, the average size of hog farms in North Carolina rose sixfold between 1989 and 1995, while the average in Missouri rose two and a half times. Those gains far exceed the 84 percent rise nationwide and the increases, ranging from 49 percent to 58 percent, among the top-ranked District states. Historically, Iowa, Illinois, and Indiana have had the largest hog farms, with averages in 1989 that were substantially above those for North Carolina and Missouri. But the average hog farm in North Carolina now has twice the number of hogs as that in Iowa, while the average in Missouri is comparable to that in Indiana (table 1).

The limited farm-size breakouts that are available in the USDA data also reveal the effect of the industrialization phenomenon in North Carolina and Missouri, as well as the collective effect among minor hog-raising states. Farms with 2,000 or more hogs accounted for 43 percent of all hogs on farms nationwide as of December 1995. In most District states however, these *large* farms accounted for a much smaller share of the hog inventories.[4] Only 26.5 percent of the hogs in Iowa were on farms with 2,000 head or more. Corresponding shares for the other District states were 36 percent for Illinois, 43 percent for Indiana, 46 percent for Michigan, and 19 percent for Wisconsin. Among the 16 major hog-raising states, those with the biggest share of hogs on large farms were North Carolina (88 percent) and Missouri (51 percent). Surprisingly enough, however, the minor hog-raising states collectively rank even higher than Missouri. Among the minor states, the share of hogs on large farms (2,000 plus head) was 59 percent (table 1).

Further evidence of where the industrialization is occurring surfaces in a comparison of hog inventory changes over the last five years. From December 1, 1990, to December 1, 1995, hog numbers nationwide rose nearly 11 percent.[5] All of that growth came in seven states, which recorded consistent (four out of the five years) growth over that period and which, for the most part, have been identified as attracting the new mega producers. Only two of those growth states, Missouri and North Carolina, are among the 16 major hog-producing states. Hog numbers in those two states more than doubled in the five years to December 1995. In comparison, hog numbers in District states—and in all other major hog states—declined 3 percent over that period (figure 7).[6] The other five states that recorded consistent growth over the five-year period are among the so-called minor hog-raising states. Colorado, Mississippi, Oklahoma, Utah, and Wyoming registered an almost threefold increase in hog numbers from December 1990 to December 1995.

Collectively, the seven growth states identified above now account for over 23 percent of all hogs nationwide, up from 11.5 percent in 1990. The growth has been

TABLE 1

Other areas attracting the larger farms

Hogs per farm

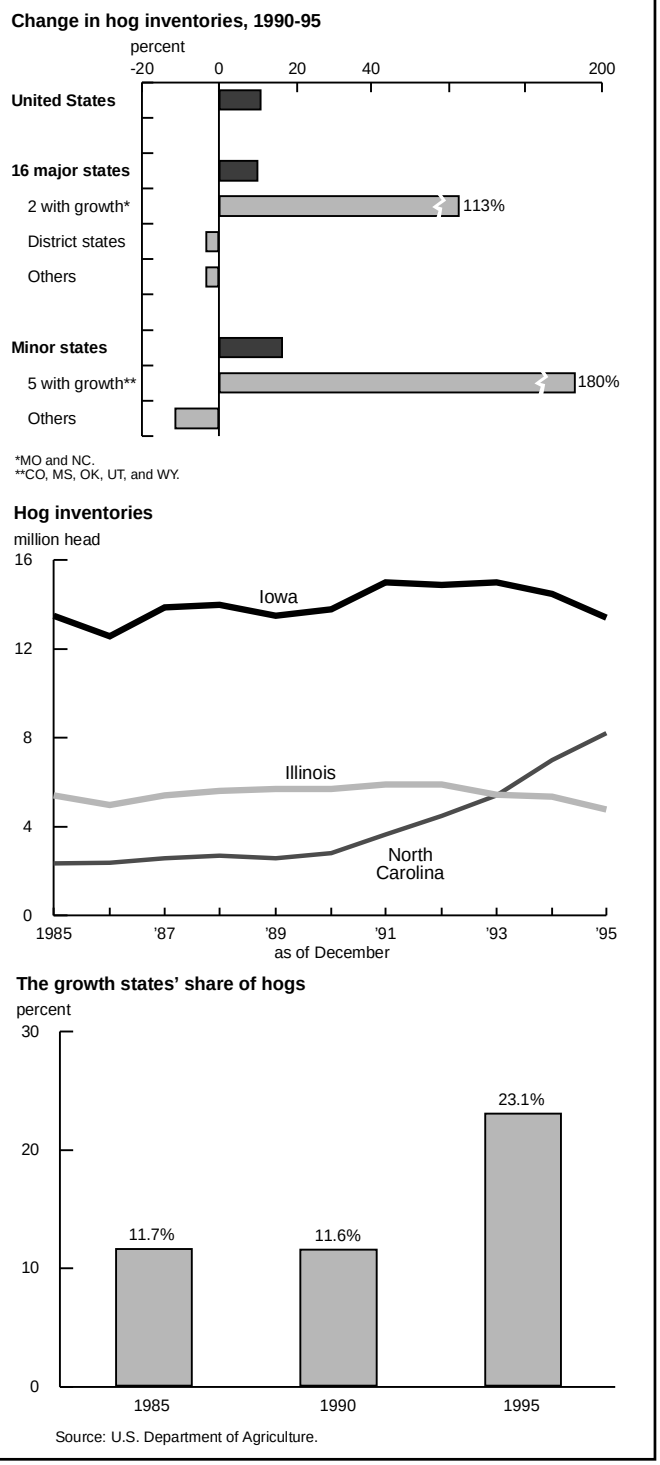
	1989	1995	Percent change
United States	179	329	84
Top-ranking states			
Iowa	365	576	58
Illinois	343	510	49
Indiana	290	432	49
Missouri	169	423	150
N. Carolina	206	1,258	511

Farms with 2,000+ hogs

	Percent of farms	Percent of hogs	Hogs/farm
United States	3	43	5,400
16 major states	3	41	5,200
Iowa	4	26	4,200
Other District	3	38	4,200
Missouri	2	51	10,200
N. Carolina	17	88	6,600
Minor states	1	59	9,100

Source: U.S. Department of Agriculture.

FIGURE 7



Source: U.S. Department of Agriculture.

especially apparent in North Carolina. In 1990, North Carolina ranked seventh with an inventory of 2.7 million hogs. In 1993, North Carolina moved into second place ahead of Illinois.[7] The revised estimates show North Carolina had an inventory of 8.2 million hogs at the end of 1995, well above Illinois's 4.8 million head and closing in on Iowa's 13.4 million head (figure 7).

A more dramatic portrayal of the extent and location of the industrialization in hog production comes from surveys conducted by *Successful Farming* magazine to identify all producers owning 10,000 or more sows.[8,9] The most recent survey (October 1996) found some 43 such producers (table 2). Collectively, those 43 producers owned 1.74 million sows or, on average, 40,500 each. Compared to similar surveys the previous two years, the latest results mark a 23 percent increase in the average number of sows owned by mega producers during the last year. The latest results also mark two large, consecutive annual gains in the total number of sows owned by producers with 10,000 sows or more. In contrast, USDA reports indicate that the inventory of hogs held for breeding purposes by all producers has declined the last two years. Assuming that sows represent about 90 percent of that inventory, it appears the 43 mega producers identified in the most recent survey own 29 percent of all sows. Adjusted for their more efficient use of sows and their ability to wean more pigs per litter, those 43 mega producers probably account for nearly 40 percent of all pigs born and raised nationwide.

Table 3 provides a closer look at the 12 largest producers as identified by *Successful Farming* in October 1996. Those 12 producers owned 1.22 million sows, accounting for about 20 percent of all sows in the U.S. The table shows the state where the firms are headquartered and the states where they have production facilities. Two District states are referenced in the table, but not very frequently. From the

TABLE 2

Producers with 10,000+ sows

	Oct. 1994	Oct. 1995	Oct. 1996	Percent change[a]
Number of producers	31	44	43	–2
Sows owned (000)				
Total	1,131	1,517	1,741	15
Per producer	36.5	34.5	40.5	23
% of U.S. sow inventory[b]	17	24	29	
Hogs held for breeding purposes by all producers (000)				
Total	7,415	6,898	6,770	–2
Sows[b]	6,674	6,208	6,093	–2

[a]From previous year.
[b]Based on author's approximation (90 percent) of the share of all hogs held for breeding purposes that are sows.
Sources: *Successful Farming*, various issues, and U.S. Department of Agriculture.

perspective of Midwest agriculture, there are several ironies in the listings. For instance, there is the reference to *family farms* in the name of the largest producer. Also, several of the companies listed are more typically associated with other agricultural commodities, for example, Tyson (poultry) and Continental Grain, Cargill, and DeKalb (grain).

Two firms in particular merit mention as a means of illustrating how mega producers are dramatically changing the structure of pork production. Fifth-ranked Premium Standard Farms (PSF) was organized in the late 1980s. Initially, PSF wanted to locate in Iowa but was unable to do so because regulations in the state precluded the organizational structure the company was proposing. Instead, it located initially in a three-county area of north central Missouri and subsequently acquired additional facilities in Texas. After building all new facilities, PSF started production in 1992. Following a comparatively modest rise of 8 percent last year, its inventory of sows reached about 105,000 head as of late 1996. In 1995, PSF opened its own packing plant in Missouri with intentions to eventually process all the hogs it raises on that site.[10]

Smithfield Foods recorded another large increase in sow inventories last year to become the second largest hog producer. It is also the second largest pork packer. Its state-of-the-art packing plant in North Carolina has two operating lines, each capable of processing 8,000 hogs per eight-hour shift. When fully operational and running two shifts on each line—as it has requested in pending applications—the plant will process some 32,000 hogs daily. At that level, that one plant would account for one-twelfth of all hogs shipped to packing plants.

TABLE 3

The top 12 producers

	Headquarters	Production sites	Sows owned	Percent change[a]
Murphy Family Farms	NC	NC, MO	260,300	14
Smithfield Foods	VA	NC, VA	112,000	18
Carroll Foods	NC	NC, VA, SC, **IA**	111,400	1
Tyson Foods	AR	AR, NC, MO, OK, AL	110,000	3
Premium Standard Farms	MO	MO, TX	105,000	8
Prestage Farms	NC	NC, MS	102,200	6
Cargill	MN	NC, AR, MO, **IL,** OK	90,000	13
Seaboard Corporation	KS	KS, CO, OK	90,000	80
DeKalb Swine Breeders	**IL**	KS, OK, **IL**, TX, **IA**, CO	72,000	0
Iowa Select Farms	**IA**	**IA**	62,000	48
Goldsboro Milling Co.	NC	NC	54,000	4
Continental Grain	NY	MO, NC, AR, **IA,**	52,000	49
			1,220,900	

[a]From previous year.
Source: Freese, *Successful Farming*, October 1996.

Characteristics of the mega producers

Various studies have shown that mega producers are more successful in capturing technological advances that lower production costs and/or improve the quality of the final product (pork) to consumers. Those technological advances are apparent in the genetics; the feeding, breeding, and handling practices; the disease-control procedures; and the buildings, structures, and facilities used to raise hogs. Reflecting the differences among producers, some observers have suggested the range in production costs between the most efficient one-third of all producers and the least efficient one-third is as much as $10 to $12 per hundredweight. Compared to the $43 per hundredweight average in hog prices the last three years, the wide range in production costs gives the more efficient producers much more staying power during cyclical downturns in hog prices. The need to remain competitive has long been a major factor in the restructuring in hog production; it continues to be the driving force behind the recent industrialization phenomenon.

Another characteristic of mega producers is they tend to operate with multiple production sites that are geared to coordinate large *batch* flows of hogs. These sites separate by location the three key stages of production and are designed to minimize or eliminate the intermingling of pigs from different batches. One site is used for breeding, gestation, and farrowing (giving birth). Following an early weaning, the young pigs are moved en masse to a separate nursery facility. Later, they are moved en masse to another site to be finished out to market weight. This practice helps guard against the spread of diseases. It also permits better utilization and specialization in the labor and facilities and in the feeding and breeding practices that are used for raising hogs.

Mega producers also operate with a highly refined form of integration that contrasts with the structure of the typical Midwest hog farm. This integration often begins with the genetic lines developed specifically for the producer's own breeding herd. As suggested above, it is also reflected in specialized labor and management for each stage of production and in state-of-the-art feed mixing and handling facilities. In many cases, these producer-owned modern facilities have led to the demise of commercial feed businesses located in rural areas. Moreover, the modern facilities have eroded much of the Midwest hog producers' traditional advantage of being in close proximity to the feed (corn and soybeans) grown in the Midwest. With such facilities and scale economies, mega producers located considerable distances from the Midwest can be competitive by relying on frequent deliveries of corn via unit grain trains shipped out of the Midwest.

The highly refined form of integration is also evident in the on-site veterinarian facilities, services, and employees maintained by many of the mega producers. Also, as suggested earlier, the integration increasingly extends all the way to the packer. In some cases, mega producers own packing plants that process only their own hogs. In other cases, mega producers' plants process their own hogs along with hogs from other producers.

A final characteristic worth noting is the increased use of contracting arrangements that have surfaced with mega producers and the industrialization in hog production. In some cases, these contracts are between the producer and a *grower*. Such arrangements permit the producer to leverage his/her capital by contracting with a grower to feed out the producer's hogs to market weight. With parallels to the contracting common in broiler production, these arrangements increasingly find the Midwest farmer becoming the grower. The producer furnishes the pigs, the feed, and the veterinarian services. The grower provides the facilities and labor in exchange for a fixed fee and, in all likelihood, an incentive clause to produce top-quality carcasses in a stipulated time period with minimal death losses.

Other contracting arrangements are between producers and packers. In some cases, these contracts are designed primarily to assure an integrator (mega producer) access to a packing plant when the integrator's hogs are ready to be marketed. Such arrangements were a key factor behind the phenomenal growth in North Carolina's hog production at a time of very limited capacity at close-by packing plants. Fortified by these contracts, it was much easier to coordinate the construction of new packing facilities simultaneously with the rapid expansion in that state's hog production. In addition, many of the contracts between producers and packers include pricing arrangements. Some

are simple formula-pricing arrangements that peg the price to the producer to some base market price. Others provide for the sharing of price risks between the producer and packer.[11] Many contracts also offer premiums to producers that consistently deliver large quantities of hogs and/or hogs that consistently yield high-quality carcasses.

Key issues for the Midwest

The industrialization that has swept the hog industry has raised a number of issues that will be critical to whether the Midwest will be able to maintain its historical share of hog production. For instance, many Midwest states, including Iowa (but not Illinois and Indiana), have restrictions that curtail or limit the involvement of large, nonfamily corporations in farming activities. In some cases, the restrictions prohibit packers from processing their own hogs. In many cases, these restrictions were originally imposed to protect the smaller, family-sized farms prevalent in the Midwest from the market power that corporate farms might exert. Although still considered worthwhile by some observers, these restrictions often preclude the organizational structures that have sprung up with the mega hog farms.[12]

The environmental concerns that have surfaced with large-scale livestock production facilities are probably the biggest issue confronting the Midwest and its dominance in hog production. The handling of livestock wastes from any size operation can, at times, cause odors that are strongly obnoxious to those located nearby. But the problems are often magnified with large, high-density hog operations. In addition, the animal waste-handling and storage practices of large operations often lead to concerns that the nutrients from the wastes—which have value as a natural fertilizer but are harmful in concentrated form—and/or the pathogens will leach into groundwater supplies, contaminate rivers, lakes, and streams through surface run-off, or vaporize into the air. These problems sometimes arise because of flooding and other extreme weather conditions. Poorly constructed facilities for holding livestock wastes and ill-advised practices in spreading the wastes over fields (to capture the soil-enhancing benefits of the nutrients and organic matter) also contribute to the problems. However, even with the best practices and management, the odor and waste concerns associated with large livestock operations seem to be under constant agitation, much like similar quality-of-life concerns that exist in communities adjacent to major airports or industrial centers.

These concerns have led to a very contentious debate in the Midwest and elsewhere, pitting agricultural and nonagricultural interests against large hog production facilities. Strong NIMBY (not in my backyard) sentiments have surfaced in many areas. These sentiments may often be formed without a clear understanding as to what extent these facilities pose a significant environmental hazard as opposed to simply a nuisance. Moreover, there is probably little understanding of the rights and obligations of producers and residents in states with right-to-farm statutes or in areas where land has been zoned for agricultural use, or granted an exemption from other zoning restrictions. Nevertheless, these sentiments increasingly serve as the catalyst for regulations to restrict the location and size of hog production facilities and their manure storage and handling practices.[13]

Implementing such regulations, however, has often been difficult. This is partly due to legal issues that can arise when the regulations treat different-sized producers in a non-uniform manner.[14] In addition, there can be problems of inequitable treatment between new producers and *grandfathered* producers and problems of *first-claim* rights between established producers and new residents (or established residents and new producers). At any rate, observers have suggested the recent success of states on the western fringe of the Corn Belt in attracting mega producers is due largely to the less intense environmental concerns in those areas as compared to the more populous rural areas of the Midwest. Lower land costs and lower population densities in those areas make it easier to site a large hog production facility a *safe* distance from neighbors. Moreover, the more sparsely populated western fringe areas have probably been more inclined to view the start-up of a large hog operation as needed economic development for the local area. Indeed, some reports have touted the substantial economic growth—in terms of jobs, local infrastructure, and amenities—that can accrue in remote areas that do attract a mega producer.

Another critical issue regarding the expanding presence of mega producers pertains to changing markets and pricing arrangements. It has been suggested that one-third of all hogs now move to market through either fully integrated ties with packers or some form of contracting arrangements with packers. For the independent Midwest farmer that markets hogs through traditional practices, there are numerous concerns about the long-run implications of these direct ties to packers. Will independent producers continue to have access to competitive markets as packer ownership and contracting of hogs continues to expand? Is the important marketing function of price discovery compromised by the growing ties between production and packers? How valid are reported market prices when a growing share of the production also receives premium payments for quantity and/or quality preferences? This issue is especially important in terms of the efficiency of the market's pricing signals in conveying consumer's preferences for pork into the allocation of resources to produce pork. Moreover, there is the question of whether prices to independent producers will become more volatile as more of the overall production is shielded by direct ties to packers. And if that is the case, will independent producers shoulder a disproportionate share of the production adjustments needed from time to time to balance supplies with demand?

Another key issue for the Midwest is the likelihood that the economic activity of pork packing and processing will follow any geographical shift in hog production. This is important for the Midwest, since it has an even larger share in hog processing than in hog raising.[15] In terms of the number of hogs on farms, Iowa is by far the largest hog producing state. Yet Iowa's home-grown hogs are not sufficient to sustain the volume of hogs processed in that state. At least one of every five hogs processed in Iowa in recent years had to be shipped in from some other state. There is little doubt that in time the geographic distribution of packing plant activity will parallel that of hog production. In 1990, for instance, North Carolina ranked seventh in hog production and tenth in hog slaughter. By 1993, it had moved ahead of Illinois into second place in hog production, and in 1996, it probably bumped Illinois from the number two position in hogs processed at packing plants.[16]

Although packing plants add considerable economic value, they do not offer the type of jobs or economic activities that are typically in high demand for economic development purposes. A job in a packing plant is tedious, repetitive, fast-paced, and carries a relatively high probability of injury. In contrast to the high wages and strong unionization that characterized meat packing in the past, wages offered in the industry today are relatively low. Moreover, packing plants today tend to be located more in regional or rural areas—as opposed to major urban centers in the past—and the jobs increasingly tend to be filled by people who have relocated from other areas, or in many cases, from other countries. This inflow of laborers and their families can result in social, educational, and housing problems that some local communities may wish to avoid. Nevertheless, the U.S. pork market is a $30 billion industry. The Midwest has long enjoyed a large slice of this market, based on its dominance in both hog production and hog processing. The possible loss of this economic activity due to the developments emerging with the industrialization phenomenon should not be viewed lightly.

A concluding observation

The hog production and processing models and standards that have come about with the industrialization of recent years present a rather foreboding picture for the typical family farm concept of Midwest hog production. The standards set by the largest hog producers now suggest that some 50 producers could account for all the hogs needed in the U.S. Moreover, the standards set by new, state-of-the-art packing plants suggest that fewer than 12 plants could process all of the country's hogs. If the restructuring process goes that far, many rural communities will be affected. Even if the Midwest were to maintain its share, the structure of hog production would differ markedly from the family-farm-dominated structure of the recent past.

NOTES

[1]The five states that comprise the Seventh Federal Reserve District are Illinois, Indiana, Iowa, Michigan, and Wisconsin. In this article, "the District," "District states," and "the Midwest" are used interchangeably.

[2]Larger producers have higher weaning rates. The weaning rate among producers with 2,000 or more hogs was 8.7 head per litter in 1995.

[3]The 16 major hog-raising states are those for which the USDA provides quarterly inventory estimates and which collectively account for over 90 percent of all hogs on farms nationwide.

[4]These are referred to as large farms here only because this is the largest size category reported annually by the U.S. Department of Agriculture. As noted below, mega farms tend to be much larger.

[5]Subsequent revisions to the December 1995 data lowered the increase to 7 percent. Revisions were made for both the major and the minor states. There was also a change in the states classified as major. So far, only the revised estimates for the newly defined major states have been published. Therefore, the following discussion uses the original estimates rather than the revised estimates. Where possible, the effects of the revisions on the five-year inventory changes will be shown.

[6]The revised estimates still show hog numbers in the two major growth states doubled over the five-year period. For District states, the revised estimates show inventories declined 8 percent over the five years. The partial revisions currently available for the other major states show a five-year decline of 5 percent.

[7]Last year, Illinois dropped behind Minnesota into fourth place.

[8]The estimates from these surveys may lack the statistical rigor usually associated with official government estimates. However, industry observers closely attuned to these developments consider the numbers to be fairly accurate.

[9]The inventory classification used here refers to sows only, not the entire inventory of hogs held by these producers. To put this in better perspective, the U.S. inventory of hogs held for breeding purposes—comprising sows, boars, and gilts (immature sows)—accounts for less than 12 percent of all hogs.

[10]On July 2, 1996, PSF filed for protection under Chapter 11 of the federal bankruptcy laws. The highly leveraged entity was crippled by very low hog prices in late 1994 and by very high feed costs in 1995/96. The company continued to operate during the filing and observers note that an extensive reorganization plan has apparently been worked out and that the firm, under new ownership and management, will likely continue to operate.

[11]A common example is the risk-sharing window pricing arrangement. Under such an arrangement, the packer and producer might agree to split the difference if prices rise above or fall below a specified window price. If the specified price window was $42 to $47 per hundredweight and the market price fell to $36, the producer would be paid a price of $39 per hundredweight. Alternatively, if the market price rose to $53, the price paid to the producer would be $50 per hundredweight.

[12]These types of restrictions led PSF to give up its initial plans for locating in Iowa and move to north central Missouri.

[13]The restrictions on location are usually expressed in terms of distances separating the production facilities from neighboring residences, schools, churches, etc. These so-called set-back restrictions can translate into costly land requirements for siting a large hog production facility, especially in the Midwest where both land values and rural population densities tend to be higher. Other efforts have tried to use zoning regulations to ban the construction of large hog production facilities.

[14]Some attempts at such regulation have tried to protect the preferred family-sized producers from the costly requirements imposed on mega producers.

[15]Due to confidentiality issues, the number of hogs shipped to packing plants in Michigan has not been published since 1990. At that time, the five District states accounted for 50 percent of all hogs processed in packing plants.

[16]On a monthly basis, packing plants in North Carolina processed more hogs than those in Illinois for the first time in May 1996.

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