

U.S. Meat Slaughter Consolidating Rapidly

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In a remarkably short 15-year period, a few large firms have come to dominate U.S. meat slaughter. In 1977, the four largest beef packers accounted for 25 percent of the industry's output. By 1992, the four largest firms accounted for 71 percent of output. That shift is not only confined to beef. Over the same period, the four largest hog slaughtering firms increased their share of industry output from 36 to 54 percent.

Firms could dominate an industry by operating many small plants. But today, most slaughter is done in much larger plants than those operated in the 1960's and 1970's. According to the most recent 1992 Census Bureau data, large plants (those with more than 400 employees) accounted for nearly 90 percent of all hog slaughter and 72 percent of cattle slaughter. Large plants were far less prevalent 20 years earlier, accounting for a little more than half of hog slaughter and only a third of beef slaughter.

The same strong trend holds if we use different measurement bases. For example, plants that slaughtered

more than half a million cattle a year handled only 12 percent of cattle slaughter in 1977 (the earliest year for which we have data), but 61 percent of all cattle slaughter in 1992. By any measurement basis, the industry has shifted dramatically toward reliance on large plants. The most recent U.S. Census Bureau data covers 1992, but related USDA data show that the trend to large plants has continued since 1992.

The major plants specialize in slaughter and fabrication into boxed beef and cut-up pork—operations that large plants can do at a lower per unit cost than smaller plants. While consolidation in the slaughter sector proceeded, suppliers of livestock also consolidated into a network of large cattle feedlots and hog farms that are able to lower costs through economies of scale and locational advantages.

Dramatic industrial changes often raise public policy conflicts. For example, animal producers frequently express concerns that growing concentration has led to less competition and lower prices for their animals. But if the industry remains competitive while moving to fewer but larger slaughterhouses, the concentration that results from scale economies can lead to lower consumer prices and improved choices, without affecting slaughter

and animal prices. Consolidation can also have indirect social effects—large production facilities might lead to serious environmental problems, if environmental controls are not adequate to properly handle the new large volumes. Similarly, food and worker safety regulations will need to keep pace with major changes in plant sizes.

Such dramatic changes are newsworthy, and impose strains on public policy, because they occur so rarely in the U.S. economy. Very few industries undergo the large and rapid increases in concentration and large plant consolidation that we have seen in cattle and hog slaughter. This article focuses on explaining how and why the cattle and hog slaughter industry changed, and provides a context for assessing current public policy conflicts. We use data from USDA and from the U.S. Bureau of the Census (see box on data sources) to describe how the organization of products and production processes has changed from 1963 to 1992, particularly specialization, products, and the role of small plants.

Product Mixes Shifted Rapidly, Especially in Large Plants

Most cattle slaughter plants 25 years ago were "carcass" plants—many were still located near major

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stockyards or close to consumers. They sold whole or half carcasses to other meat processors or to retailers who then separated the carcasses into retail cuts of meat. Of course, the whole animal was used, then as now. Slaughter plants shipped large volumes of hides, blood, bonemeal, internal organs, and trimmings that were separated from carcasses during slaughter. These byproducts were used to make clothing, pharmaceuticals, sporting goods, animal feeds, and food products. But since the 1970's, slaughter plants have also moved into the further fabrication of carcasses, cutting them up into "boxed beef" and ground beef products (see box on today's cattle industry).

Hog slaughter plants performed several related functions 25 years

ago. They slaughtered hogs, cut up the carcasses, and sold fresh pork in addition to processing the meat into bacon, hams, sausages, and other products. More recently, these processing functions have become separated. New large slaughter facilities now specialize mainly in hog slaughter and carcass cutting. Some traditional brand-name pork processors no longer slaughter hogs. Instead, they purchase cut-up carcasses from slaughter plants for processing into bacon, hams, and other brand-name products.

Boxed beef production, particularly in the large plants that now account for most cattle slaughter, has grown dramatically, from 7.9 percent of large plant output in 1963 to 21.3 percent in 1972 and 67.2 percent in 1992 (table 1). (In this article,

output refers to the dollar value of shipments from slaughter plants.) Large plants in hog slaughter always performed more fabrication than cattle plants, but hog plants also shifted sharply to cut-up pork production during the 1980's and 1990's. Increased sales of boxed products mirrored declines in carcass sales. Carcasses accounted for less than 5 percent of output from large cattle and hog plants by 1992.

Boxed beef production is carried out primarily in large plants (table 1). Boxed beef accounted for more than two-thirds of the output in large plants, but less than 15 percent of output in plants with fewer than 400 employees, as smaller cattle slaughterhouses continued to ship whole carcasses and ground beef products. Larger fabrication lines have significantly lower average costs of producing boxed beef and cut-up pork. Economies of size in fabrication, therefore, may be a principal source of the shift to larger plants and a more concentrated slaughter industry.

Meat processors, wholesalers, and retailers purchase boxed beef and cut-up pork because slaughter plants can fabricate carcasses at lower costs per pound and can then ship specific meat cuts to areas of greatest demand. For example, USDA data track the farm to wholesale price spread for Choice beef (the difference between farm prices and wholesale meat prices, which reflects slaughter and fabrication costs as well as transportation). Between 1970 and 1982, a period of high inflation in the United States, the farm to wholesale price spread for Choice beef rose by 5.8 percent per year, while overall inflation was 7.2 percent per year. During the rapid consolidation of the slaughter industry after 1982, overall inflation was lower—3 percent per year through 1996. But the farm to

Data Sources

The primary source of data used in this article is the U.S. Census Bureau's Longitudinal Research Database (LRD). The LRD details the records of individual establishments reported in the Census of Manufactures. Since 1967, these economic censuses have been taken in every year ending in "2" or "7" (for example, the most recent was in 1992, and the next will cover data for 1997). The file also includes establishment records from a census taken in 1963.

The data provide detailed information on the mix of products, quantities and prices of material inputs, employment and average wages, and ownership and location for each establishment. Because the LRD contains data on individual plants over several census periods, researchers can make comparisons across plants at a point in time, and can also trace changes in product and input mixes, costs, and concentration over time. While researchers have access to individual establishment records for research purposes, they may not divulge information on any individual plant or firm, and

may only publish aggregated information.

The concentration data reported in the article are based on LRD records, and have a different measurement basis than concentration data reported by USDA's Grain Inspection, Packers and Stockyards Administration (GIPSA). GIPSA reports concentration information based on animal inputs—the share of all cattle or hogs slaughtered by the largest four firms. Our reported numbers are based on an LRD output measure—the four largest firms' share of the dollar value of shipments from all cattle or hog slaughter plants. The LRD measure for cattle slaughter in 1992 (71 percent) should be higher than the corresponding GIPSA measure (64 percent) because the largest plants slaughtered a higher proportion of higher valued cattle (steers and heifers), and because larger plants tended to add more value through boxed beef production. The two sources show the same sharp increase in cattle and hog slaughter concentration after 1977.

Table 1

Product Mix Has Shifted Toward Boxed Products, Especially in Large Plants

Industry and size of plant	1963	1972	1982	1992
<i>Percent of boxed and cut-up products in output</i>				
Beef:				
0-24 employees	10.9	11.0	16.8	d
25-99 employees	7.7	11.4	15.8	19.1
100-399 employees	10.1	12.6	12.7	11.7
Over 399 employees	7.9	21.3	47.5	67.2
Pork:				
0-24 employees	33.4	27.5	d	d
25-99 employees	36.0	34.5	47.9	45.3
100-399 employees	37.7	50.4	63.9	67.2
Over 399 employees	43.1	46.0	50.8	71.8

Note: Entries labeled 'd' could not be disclosed because of confidentiality restrictions. Source: Tabulations based on the Longitudinal Research Database (LRD) at the Center for Economic Studies, U.S. Bureau of the Census. The industries are the five-digit classes for beef (20111) and pork (20114) slaughter products.

wholesale price spread for Choice beef actually fell by about 0.5 percent per year, even as wages in slaughter plants rose along with increases in prices for packaging materials, equipment, transportation services, and other inputs that slaughter plants use. The increased efficiencies of the larger plants allowed total slaughter costs per pound to fall slightly between 1982 and 1996. If slaughter costs had not fallen, but had instead risen as rapidly as overall inflation, then consumer beef prices would be about 6 percent higher today.

Trimming from fabrication lines in steer and heifer slaughter plants are often combined with leaner meat from imports and from cow slaughter plants to produce ground beef. Historically, slaughter plants shipped the trimmings to retailers, who processed the ground beef. Today, the ground beef market is an opportunity for large slaughter plants. The largest plants, which account for only one-quarter of total ground beef sales, are adding grinding operations and attempting to expand in that market. Ground beef accounted for 9 percent of large

slaughter plant output in 1992, up from 3 percent 30 years earlier. But small slaughterhouses and specialty processors still handle the most ground beef, and the product is increasingly important for small plants. By 1992, ground beef production accounted for 22 percent of small plant output, up from 6 percent in the 1960's.

Many processed pork products (bacon, hams, sausage, and cold cuts) are sold under well-known brand names. When large slaughter firms, such as IBP, began to build hog slaughter plants, they focused on slaughter and carcass cutting. Since they avoided the development of brand names needed to sell processed products, they sold their cut-up pork to producers of brand products, such as Oscar Mayer, who had left slaughter to specialize in processing. This current separation may not be permanent, as some large slaughter firms are now exploring moves into further processing of pork.

Slaughter Plants Now Specialize in Single-Species Operations

In 1963, the largest cattle slaughter plants also slaughtered other animals—primarily hogs. In that year, cattle accounted for only a little more than half of all dollars spent on animal purchases at the large plants. But by 1982, cattle accounted for 92 percent, and 100 percent by 1992. Moreover, that shift does not account for shifts within species. The largest cattle slaughter plants today do steers and heifers only, while cow slaughter is done in smaller plants.

Large hog slaughter plants were more specialized than cattle plants in the 1960's, but they also often slaughtered other animals. Today, those large plants specialize almost exclusively in hogs, and often specialize in hogs of a particular shape and size. Large hog farms produce enormous weekly flows of hogs with standard sizes, shapes, and meat characteristics for slaughter facilities nearby. Large farms and slaughter plants are frequently linked through common ownership or long-term contractual relation-

ships (see “Changing Pork Business Affects Pork Prices and Quality,” elsewhere in this issue).

Modern large plants handle large volumes of production quickly—often up to 350 cattle an hour, while modern hog plants can handle 1,000 hogs an hour. In order to achieve those speeds, slaughter and fabrication lines are designed to operate on quite specific animal species and shapes. Lines would have to be reconfigured to handle different species or differently sized animals in a species. Reconfiguration adds costs and slows production speeds. As a result, specialized plants are the least-cost way to produce large volumes of popular meat cuts.

Some small plants maintain market niches by slaughtering a variety of different species and different animal types within a species, thereby meeting special or local demands. Typical small plants slaughtering cattle still apply 15-20 percent of their animal purchase dollars to other species.

Concentration Seen in Industry Turnover

In many industries, such sharp changes in specialization, concentration, or industrialization would be brought about as new plants replaced old ones. The new processes would be embodied in new plants, rather than introduced into redesigned older plants. On the surface, this pattern appears to have occurred in cattle and hog slaughter, too, as many new plants have opened and many old ones have closed (table 2). But that surface appearance is not entirely true—many important changes in product mix, plant size, and specialization have been brought about within existing redesigned plants.

After 1977, large plants came to dominate production, and concentration increased sharply. (Table 2 combines hog and cattle slaughter in order to preserve confidentiality, but

the message would not change if the data were disaggregated.) Economic censuses are taken every 5 years, and the data show that a large fraction of the industry’s plants exited

during each 5-year period between censuses. For example, more than half of the plants in the industry in 1977 exited by 1982. Most closed, although a few facilities were

Table 2
Frequent Entry and Exit by Slaughter Plants

Item and type of plant	1977-82	1982-87	1987-92
<i>Percent</i>			
Share of all plants:			
Entering plants	9.3	20.6	15.7
Exiting plants	51.3	39.9	36.6
Acquired plants	13.1	10.5	18.2
Share of industry output:			
Entering plants	5.4	12.3	6.0
Acquired plants	33.1	22.7	31.0
<i>Number</i>			
Number of plants:			
Start of period	1,002	716	479
End of period	716	479	397

Note: Hog and cattle slaughter categories are combined in order to preserve confidentiality. Source: Tabulations based on the Longitudinal Research Database (LRD) at the Center for Economic Studies, U.S. Bureau of the Census. The industries are the five-digit classes for beef (20111) and pork (20114) slaughter products.

Table 3
But New Plants Do Not Survive for Long

Size of plant and year of entry	Percent of entry plants surviving		
	5 years	10 years	15 years
<i>Percent</i>			
0-24 employees:			
1967	36.2	11.6	10.1
1972	15.4	12.8	10.3
1977	9.1	7.3	d
1982	d	d	NA
1987	13.5	NA	NA
Over 24 employees:			
1967	33.3	17.4	10.1
1972	53.8	21.8	12.8
1977	18.2	9.1	7.2
1982	34.3	18.7	NA
1987	24.3	NA	NA

Notes: NA = Not applicable. Entries labelled ‘d’ could not be disclosed because of confidentiality restrictions. Year of entry refers to year of first appearance in the census. Source: Tabulations based on the Longitudinal Research Database (LRD) at the Center for Economic Studies, U.S. Bureau of the Census. The industries are the five-digit classes for beef (20111) and pork (20114) slaughter products.

The Cattle Industry Today

Over the last 25 years, a closely connected network of large cattle feedlots, high-volume slaughter plants, and efficient transportation links has been developed for the cattle industry. By 1992, 13 large slaughter plants, owned by four different firms, accounted for more than half of all steer and heifer slaughter in the United States (the leading firms also operate a dozen smaller plants in dispersed locations). The plants have similar design and operations. Each is designed to slaughter 4,000 to 5,000 cattle a day, in two 8-hour shifts. The day after slaughter, chilled carcasses are moved to “fabrication” lines to be cut into wholesale and retail cuts of meat, and then vacuum-packed. The wrapped cuts are packed in boxes of 40 to 60 pounds, and the boxed beef is then shipped in 20-ton containers to wholesalers, processors, and retailers across the United States.

Increasing volumes of boxed beef are exported, usually to Asia. The beef bound for Asian markets is usually shipped by truck or rail from the plants to west coast ports for shipment.

Each large plant provides employment for between 1,500 and 2,500 workers, who receive compensation, including fringe benefits, averaging \$12 to \$15 an hour. Most of the workers perform repetitive routine tasks in either the slaughter or the fabrication department. Typically, the plants assign 2 hours of labor to fabrication lines for every hour on slaughter lines. The largest plants are located in a limited geographic area—Nebraska, Kansas, eastern Colorado, and the Texas Panhandle. They were built there in order to operate among the network of large cattle feedlots that purchase feeder cattle

and feed from around the country and then supply the plants with a steady flow of high-quality grain-fed steers and heifers.

In the 1960's and early 1970's, many small cattle feedlots were located in the Corn Belt and west coast as well as in the Great Plains. Since then, feedlots have concentrated along with the slaughter industry. Today, there are a little over 200 large feedlots (those selling more than 16,000 head of cattle a year) that together sell over 13 million steers and heifers—or more than half of the total slaughter. Two decades earlier, large feedlots sold just over 5 million head—less than a quarter of the total. Most of the gain in large feedlot marketings has come at the expense of small seasonal feedlots (less than 1,000 head sold in a year). The number of these feedlots has shrunk rapidly in the last two decades, as farms that had mixed seasonal feedlot operations with crop production and sales have since shifted to specialize in grain grown for cash sale rather than for feeding.

Most large feedlots are located in the Great Plains. The arid conditions lead to less snow and mud than in the Corn Belt. Bad weather can limit cattle feeding efficiency by diverting the effects of feeding to body maintenance and by increasing the energy needed to move around the feedlot. Animals are also more likely to injure themselves in bad weather. Effective truck transportation allows for long distance movements of grain and feeder cattle into the region and meat products out, while the more difficult and costly transport of fed cattle from feedlot to slaughter goes in short moves within the region.

adapted to produce other products. Forty percent of the plants surveyed in 1982 closed by 1987, and more than a third of the plants surveyed in 1987 closed by 1992.

But many new slaughter plants started operations, even in the face of huge numbers of exits. For example, over 20 percent of the plants in operation in 1987 were not in the industry in 1982, while 15.7 percent of the industry's 1992 plants were new since 1987. These two bits of evidence, high and simultaneous rates of entry and of exit, are typical of modern manufacturing industries—similar patterns have been found in Canadian, Japanese, and Western European economies. Moreover, the much higher rates of exit relative to entry match the changes in concentration. Much of the change was brought about as a few new large plants replaced many older and smaller plants.

But that evidence captures only part of the story. Most of the entries and exits were among small plants. The shares of industry output accounted for by new entrants and by exiting plants is quite small. For example, new entrants accounted for only 6 percent of industry output in 1992, even though they accounted for 15.7 percent of all plants. In each census period, “new entry” includes a few of the large plants that now dominate slaughter, but it also includes many small plants, which appear to face distinct disadvantages in an industry that is consolidating rapidly.

New small entrants rarely last long (table 3). (Table 3 orders new plants according to the year in which they first appeared in Census data. It also divides them into two size classes—very small plants with 24 employees or fewer, which constitutes about a seventh of all plants, and all others. Confidentiality concerns preclude a finer size breakdown.) Most new slaughter plants

do not last 5 years. Only about 10 percent of the very small firms and 20 percent of all others last 10 years. Although the table does not separately display them, large new plants (often with 1,000 to 2,500 employees) do last for long periods. Rapid exit occurs among the many small plants that enter the industry. These results suggest that many of the exiting plants in table 2 were small plants that only recently entered the industry, and then closed.

Entry and exit are not the only vehicles for turnover in industry. Ownership change, through the sale of existing plants to new owners, is also important, particularly among large plants in cattle and hog slaughter (table 2). For example, plants that changed owners between 1987 and 1992 accounted for a third of combined output from cattle and hog slaughter plants in 1992. Similarly, plants that changed owners between 1977 and 1982 accounted

for a third of 1982 cattle and hog slaughter output, and plants responsible for over a fifth of 1987 output changed owners between 1982 and 1987. Ownership changes were frequently followed by major changes in plant operations—through investment and expansion, changes in product mix, or both.

How Do Smaller Plants Survive?

Not many of them do. The number of small plants and their share of the market has declined precipitously. In 1972, 573 cattle slaughter plants had fewer than 100 employees, and they accounted for 23 percent of industry output. In 1992, 124 firms were in that size class, and they accounted for 5 percent of industry output. Smaller slaughter plants, new and reopened, frequently attempt to enter the business, but rarely survive for long.

Those small plants that do survive do not attempt to mimic large plants. While large plants are easy to characterize in terms of a small number of processes and outputs,

small plants cover a bewilderingly wide variety of products and processes (many quite different from slaughtering livestock and processing meat). They produce a different mix of meat products, such as carcasses and sometimes ground beef. Many avoid the large plants' reliance on standardized animals; they will instead slaughter a variety of species for local demands, or they may specialize in slaughtering cows or unusual cattle types. Successful small plants often cultivate a particular clientele. Some may aim to provide particularly high-quality beef to the local and regional restaurant trade, while others may provide slaughtering and processing services to a network of producers and consumers of specialized products, such as organically produced meat. Others may combine purchased trimmings with their own cow slaughter to provide fresh ground beef products for nearby clients. ■