



# UNPACKING THE MEAT INDUSTRY

Changes in the meat supply chain have brought benefits, but are vulnerabilities a cause for concern?

By Emily Green

**T**he COVID-19 pandemic hit meat processing facilities in the United States suddenly and dramatically. Between April 9 and April 27, more than 4,900 COVID-19 cases were reported among 115 different meat and poultry processing facilities. Rising cases and contamination fears led major processors, such as Smithfield, Va.-based Smithfield Foods, to shut down plants in April. During this period, large retailers like Kroger and Costco implemented meat rationing. These developments prompted President Donald Trump to invoke the Defense Production Act on April 28, compelling plants to remain open — and brought the resilience of the meat supply chain under scrutiny.

The food industry is important, and not just because people need to eat. In economic terms, agriculture, food, and related industries not only contributed \$1.053 trillion to U.S. GDP in 2017 — nearly 5.4 percent of total output — but also represent an important source of employment. According to the U.S. Department of Agriculture (USDA), the U.S. meat industry in 2019 produced 104.5 billion pounds of turkey, broiler chickens, pork, and beef — of which 20.5 billion came from the Fifth District. (See chart.) In 2018, agriculture, food, and related industries provided 22 million jobs, 11 percent of total U.S. employment, with meat and poultry plants representing nearly 500,000 jobs and farms representing 2.6 million jobs.

IMAGE: COURTESY OF PERDUE FARMS

The path from farm to table of U.S. meat is more complex than ever. The meat industry’s relentless transformation over the last half-century has increased supply chains’ complexity while consolidating businesses at each link of the chains. The product of this evolution is the food system consumers have come to expect — one with immense variety, consistency, constant availability, and cheap prices. Yet the modern system is also rigid and vulnerable to disruptions, as the pandemic has highlighted.

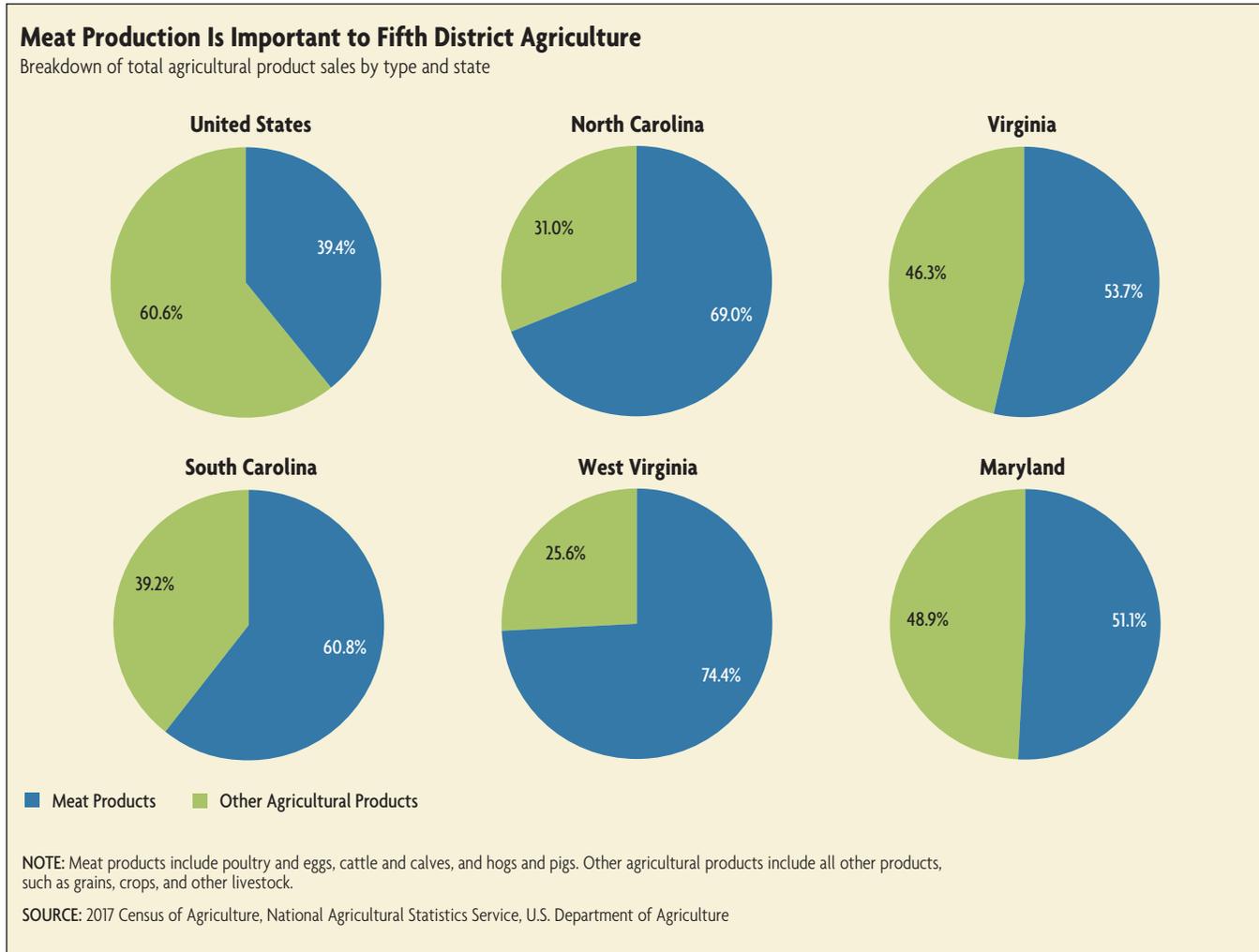
**Waves of Changes**

Beginning in the 1970s, consumer spending on food as a share of total disposable income declined, yet consumer demand shifted toward products that were consistent, ready-made, and healthier, driving the evolution of the meat supply chain. Whereas Americans in 1960 spent an average of 17 percent of their disposable personal income on food, USDA data reveal that by 2019, Americans spent an average of only 9.5 percent of their income on food. Their data suggest the decline has been driven most by decreased spending on food at home — that is, on groceries.

In addition, starting in the 1970s, higher labor participation among women further shifted consumer preferences toward ready-made products, one-stop

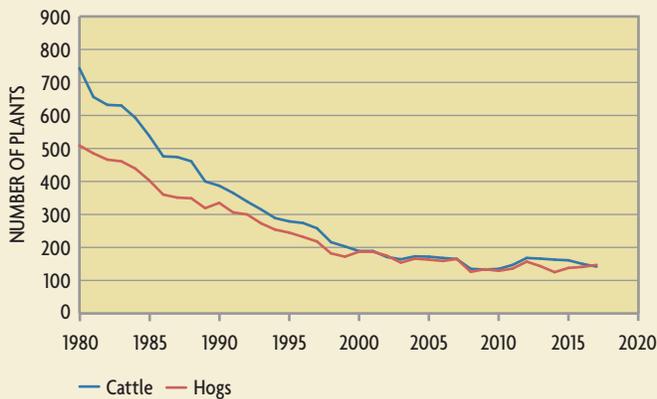
shopping, and eating away from home. Higher patterns of meat consumption and dining out also increased the demand for meat products over this period. Moreover, consumer demand for selection variety and supply consistency at low cost prompted consolidation and new procurement practices among the meat processing, retail, and upstream segments of the supply chain.

Meat processors and packagers were the first segment of the meat supply chain to undergo a significant wave of consolidation, from 1972-1992. Consolidation in the poultry industry in the 1960s reduced the price of chicken while increasing output and product selection. This caused poultry consumption to surge while beef and pork processors’ profits fell. Alan Barkema, Mark Drabentstott, and Nancy Novack, then with the Kansas City Fed, explained in a 2001 article that the reduced profits prompted cost-cutting efforts and renewed competition. Meat processors realized cost savings from improved technology for storing and cutting animals and reorganizing the production line with more low-wage workers, allowing for efficiency improvements. For example, larger plants adopted technology to support more fabrication — that is, cutting — of carcasses into wholesale cuts, reinforcing their cost advantages of scale.



### Cattle and Hog Processing Plants Are Becoming Fewer

Number of slaughter plants operated by type of livestock, 1980-2017

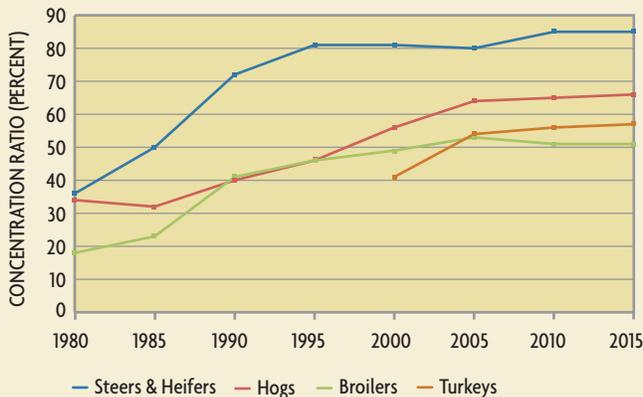


NOTE: Includes both federally and nonfederally inspected establishments. Firms purchasing less than \$500,000 of livestock are not required to report.

SOURCE: Packers and Stockyards Statistical Report, 2000; Packers and Stockyards Program Annual Report, 2012; Packers and Stockyards Division Annual Report, 2018; U.S. Department of Agriculture

### Concentration Among Meat Processors Is Rising

Four-firm concentration ratios in meatpacking and poultry processing



NOTE: Steers and heifers, or fed cattle, are animals raised specifically for slaughter and do not include animals raised for breeding and then slaughtered at a later point (i.e., cows and bulls).

SOURCE: 2003, 2005, 2007 Assessment of the Cattle, Hog, Poultry and Sheep Industries Report; 2011, 2017, 2018 Packers & Stockyards Program Annual Report; U.S. Department of Agriculture

Subsequently, these processors' transportation costs also declined since they were shipping boxes of products rather than carcasses, while they shifted toward specialization in a single species in order to increase the efficiency of their technological investments. For example, Smithfield Foods, founded in 1936, was on the verge of bankruptcy in the early 1970s before it transformed by streamlining its operations, acquiring underperforming pork companies, and slashing overhead by reducing middle-tier workers, leading to strong growth throughout the late 1970s and 1980s.

A 2005 USDA report found meatpacking and processing workers' average wages dropped about a third, while

meatpacking plant size doubled and output per meatpacking worker increased 45 percent from 1972-1992. "Both the introduction of scale economies from technology and the reduction in union wages among workers in large plants in the 1980s meant that larger plants now had a significant cost advantage over smaller plants," says James MacDonald of the University of Maryland, formerly acting chief of the Structure, Technology, and Productivity branch at the USDA's Economic Research Service.

Meanwhile, renewed competition for market position propelled a surge in mergers and acquisitions as processors sought to establish economies of scale. Large plants were especially well positioned for this transition due to the increased cutting up of meat products that enabled technological scale economies. For example, Smithfield acquired some 40 firms from 1981 to 2006, allowing it to become the world's largest pork processor and hog producer today. A 2006 article in the *American Journal of Agricultural Economics* by Sang Nguyen of the U.S. Census Bureau's Center for Economic Studies and Michael Ollinger of the USDA's Economic Research Service concluded such mergers and acquisitions were motivated by desires to improve efficiency by acquiring other highly productive plants in synergistic mergers. These efforts culminated, however, in fewer competitors in the industry and larger market shares. (See chart.) The four-firm concentration ratio (CR-4), which measures an industry's concentration through the combined market share of its top four firms, grew between 1972 and 1992 from 26 percent to 50 percent in meatpacking, from 16 percent to 25 percent in meat processing, and from 17 percent to 34 percent in poultry slaughter and processing. By 2017, the CR-4 for the entire meatpacking and poultry processing industry was 67 percent. (See chart.)

### The Retail Revolution

Among food retailers, the supermarket revolution embodied the industry's response to changing consumer demand. Beginning in the 1930s and accelerating in the 1970s, small local grocery stores and specialty stores, such as butchers and bakeries, declined while supermarkets grew to dominate the industry by offering huge variety, consistency, and low-cost products — all in one location. In a 2012 paper, Thomas Reardon of Michigan State University and C. Peter Timmer of Harvard University found the concentration ratio of the top six firms in the supermarket sector grew from 32 percent in 1992 to 50 percent in 2000 and is now even larger in some regional markets. Within the Fifth District, the dominant retail chain varies by state, but Food Lion and Harris Teeter are among the local retailers that have a strong presence in the region's markets.

Richard Sexton of the University of California, Davis and Tian Xia of Kansas State University noted in a 2018 article that retail consolidation was driven by competition for regional dominance through efficiency gains and new



*The Giant food shopping center on Wisconsin Ave. in Washington, D.C., in summer 1942.*

explains. “That allows a single farmer or family farm to manage a lot more animals.”

The median farm size, in annual production, nearly doubled for the cattle and broiler industries from 1987-2002. This shift in the median size reflects how larger farming operations capitalized on technological advances to reduce average production costs relative to smaller farms.

Additionally, food retailers’ and processors’ new procurement practices, such as vertical coordination and contract production, helped farmers ensure they could sell their products, thereby solidifying their profit and return on investment. For

procurement practices to attract customers. These novel methods involve more direct contracting with farmers, known as contract production, where farmers and processors enter into contracts directly with supermarkets, eliminating the role of wholesalers and locking themselves into specific buyers. This coordination improves synchronization throughout the supply chain as retailers and processors impose private standards on farmers to regulate product characteristics, share information on production practices, and even provide feed and animals to secure a stable flow of products.

“The shift of consumer purchases toward large-scale retailers also shifts you toward contract production because retailers purchase from large processors that have large, steady flows of uniform meat due to their own contract system with growers,” says MacDonald. “Development of consumer demand toward a preference for more uniform, lean products and large-scale supermarkets probably favored large-scale processors.”

### **Farming’s Transformation**

For farmers, cost-cutting measures at the retail and processing stages of the supply chain translated upstream, driving them to transform production practices to improve efficiency and reduce costs. A 2009 report by MacDonald and William McBride of the USDA found these transformations included “changes in production technologies, increased enterprise specialization, and tighter vertical coordination between the stages of production.” For example, Perdue Farms, established in Salisbury, Md., evolved from a family poultry farm in the 1920s to the eighth-largest meat and poultry processor in the United States by net sales in 2018 by investing in technological advances and introducing new products.

“It was a steady process over several decades of figuring out better ways to confine animals within structures with improved ventilation and climate controls, delivery of feeds to the animals, and removal of manure,” MacDonald

Perdue, this involved expanding from farming into the processing sector in the late 1960s and then into the food service, turkey, and ready-made product markets through the 1980s and 1990s.

“Buyers are transferring information through those contract arrangements — giving their contract growers guidance on how to raise their animals and design their facilities — and providing them with well-formulated feed and young animals with improved genetics,” says MacDonald. In fact, by 2005, over 50 percent of livestock production was contractual and long term. “For farmers it’s a very real trade-off,” MacDonald adds. “You get reduced risks — you’re not worrying about marketing or price fluctuations — but you’re tied into one buyer, and you’re going to have to do what they want.”

### **Improving Resilience**

The evolution of the meat supply chain benefited each of the actors involved. Consumers received the reliable, consistent products they demanded at low cost and in one stop. Dominant food retailers benefited from greater consumer demand for meat, brand loyalty, and stable supply products. Processors and packagers solidified market positions, cut costs, and improved productivity. Large-scale livestock farmers profited from stable contracts and lower operating costs.

The trade-off has been the meat supply chain becoming more vulnerable to disruptions. Specifically, vertical coordination and contract production make it difficult to switch production in response to sudden changes because the synchronization in private product standards and strict contracts make it harder to switch suppliers. Greater complexity and consolidation create more locations where a single disturbance can have a devastating effect on the rest of the chain.

Until recently, these drawbacks have been considered less significant than the benefits. But the COVID-19 pandemic highlighted the meat supply’s vulnerability. The



*A sign limiting meat purchases at Sprouts Farmers Market in Herndon, Va., in May 2020, during the COVID-19 pandemic.*

dangers of disruption were clear in the reports of livestock being euthanized, shutdowns at processing and packaging plants, and product shortages in stores.

The same could happen again, perhaps on a worse scale. Disruptions in the future could come not only from pandemics, but also from natural disasters, infrastructure failures, or political turmoil.

In principle, the most obvious approach to boosting the resilience of the meat supply would be to reverse the consolidation and procurement practices that increased rigidity and segmentation, thereby preventing chokepoints and other risks. Yet modern meat supply chains also enable consistent delivery of highly uniform meat products at low prices, so restructuring would likely

a dwindling flow of low-skill labor,” explains MacDonald. “Firms are looking at alternatives that involve more equipment and fewer people — the longer-term issue driving it is rising wages for labor.” Processors such as Tyson Foods, Pilgrim’s, and JBS believe using greater automation could allow workers to focus on higher skilled parts of the processing chain and improve resilience and output. Yet this approach would only improve resilience against disruptions caused by a supply-side shock affecting workers. Additionally, a risk of automation is the elimination of meat processing jobs that could devastate communities where plants are located.

Resilience-building efforts have also focused on increasing local meat production-consumption ties through

increase meat prices while reducing consistency.

A long-term approach favored by meat processors aims to use technological advances to automate greater parts of meat processing to reduce the risk of bottlenecks caused by a shortage of skilled meat workers.

“The model of large plants with lots of low-skill labor has been undermined in the last decade by

## Food Hubs

Food hubs are an important example of intermediaries in regional supply chains that have values-based community missions. According to the USDA, food hubs are businesses and organizations that provide resources and services to local and regional producers to improve their capacity to match consumer demand. Within the Fifth District, there were 40 food hubs in 2019, representing 17 percent of the national total. Most Fifth District food hubs offer distribution, aggregation, and processing services and engage their communities through donations to food banks, Supplemental Nutrition Assistance Program benefits, also known as SNAP, and nutritional education or workforce development programs.

“Ways to improve production flexibility are capital-intensive,” says Miguel Gomez, director of the Food Industry Management Program at Cornell University. “Food hubs can play a key role as points of aggregation and post-harvest processing to help farmers achieve larger volumes and be efficient in distribution.” Surekha Carpenter of the Richmond Fed explained in an article last year that food hubs provide small farmers with access to these capital-intensive resources that they would not have individually. (See “Food Hubs: Mission-Driven Local Food Systems in the Fifth District,” *Community Scope*, 2019.) As seen in the Fifth District, food hubs’ social missions make them unique among participants in supply chains and allow them to benefit low- and moderate-income communities.

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IMAGE: KRISTI BLOKHIN/SHUTTERSTOCK

regional food systems that shorten and simplify supply chains. These systems include direct or intermediated supply chains. Direct supply chains sell local products straight to consumers through roadside stands, farmers markets, or on-farm stores. Intermediated ones facilitate local sales to consumers through middlemen such as distributors, restaurants, and retailers. “The big challenge for local foods is competing on price with mainstream supply chains,” says Miguel Gomez, director of the Food Industry Management Program at Cornell University. “When their products are differentiated because of quality, like seasonal produce, or local preferences, like for grass-fed beef or organic, they can receive price premiums.”

Among consumers, the 2018 National Grocers Association’s (NGA) National Survey of Grocery Shoppers found 59 percent of consumers select their store partly for its selection of local foods. The growth of direct sales for local foods plateaued from 2007-2012 even as total sales grew by about \$1.3 billion. Specifically, retailers began to participate in intermediated supply chains to increase local food sales and satisfy consumer preferences.

A second key aspect of regional food systems is their community focus, which can be increased through local intermediaries such as food hubs. (See sidebar.) Consumers value these community ties — the NGA found 57 percent of shoppers support their local supermarket because it is linked to the community.

Additionally, other groups, such as meat trade organizations, may work to improve ties between farmers and producers in their area. “We have a lot of programs; we’re engaged heavily in education and providing resources for farmers from soil health to animal well-being, maximizing feed efficiency to managing manure as a resource,” said Andy Curliss, who was then CEO of the North Carolina Pork Council, in a July interview. “We’re a forum where our farmers can learn about and discuss new and innovative things.”

One proposal aimed at increasing local meat consumption ties is the Processing Revival and Intrastate Meat Exemption (PRIME) Act, a bill before the House Agriculture Committee with bipartisan co-sponsors. Current federal law requires meat products to be inspected at USDA- or state-monitored plants that meet federal

guidelines before public sale. The PRIME Act would allow meat processed at custom plants complying with state laws to be sold directly to consumers and establishments in the same state and would exempt that meat from federal inspection requirements. Expanding possible processors could allow small farmers to use state-regulated custom plants to reduce costs. Proponents say this would decrease the price of local meat, help small processors, and allow businesses to source local meat more affordably while reducing chokepoints in the supply chain. Several meat trade associations, such as the National Pork Producers Council, oppose the bill, contending that the commercial sale of nonfederally inspected meat products could compromise food safety.

### Consumers’ Choice

One critical question is whether consumers will actively seek more resilient meat supplies — and pay for them. In the case of regional food systems, local foods are generally more expensive, and consumers may be unwilling or unable to pay premiums for local or higher quality meat. “In general, consumers who pay premiums for local or socially responsible products are more affluent,” Gomez notes. “Income disparities may prevent some households from paying those price premiums.” Furthermore, the NGA’s 2018 survey report found a potential price increase of 10 percent caused 58 percent of consumers to switch supermarkets.

Overall, a transition toward greater resilience likely requires more research into consumer preferences and the trade-off between efficiency, consistency, safety, and prices. “It will be gradual, and we still need to do a lot of thinking about that,” says Gomez. “There must be incentives for companies to decentralize. We need more research to identify the right food supply chain infrastructure required to support a decentralized food system, and we need a better understanding of consumer preferences for regionally and locally produced foods.” As long as consumers and voters view the probability of additional significant disruptions like the COVID-19 pandemic as low, the perceived benefits of modern supply chains’ cheap and consistent products may outweigh the value of more resilience. **EF**

### READINGS

Barkema, Alan, Mark Drabenstott, and Nancy Novack. “The New U.S. Meat Industry.” Federal Reserve Bank of Kansas City *Economic Review*, Second Quarter 2001, pp. 33-56.

Carpenter, Surekha. “Food Hubs: Mission-Driven Local Food Systems in the Fifth District.” Federal Reserve Bank of Richmond *Community Scope*, 2019, vol. 7, no. 2, pp. 1-11.

MacDonald, James M., and William D. McBride. “The Transformation of U.S. Livestock Agriculture: Scale, Efficiency, and Risks.” U.S. Department of Agriculture Economic Research Service, Economic Information Bulletin No. 43, January 2009.

Sexton, Richard J., and Tian Xia. “Increasing Concentration in the Agricultural Supply Chain: Implications for Market Power and Sector Performance.” *Annual Review of Resource Economics*, October 2018, vol. 10, pp. 229-251.