

The United States Pork Industry 2021: Current Structure and Economic Importance

By Holly Cook and Lee Schulz



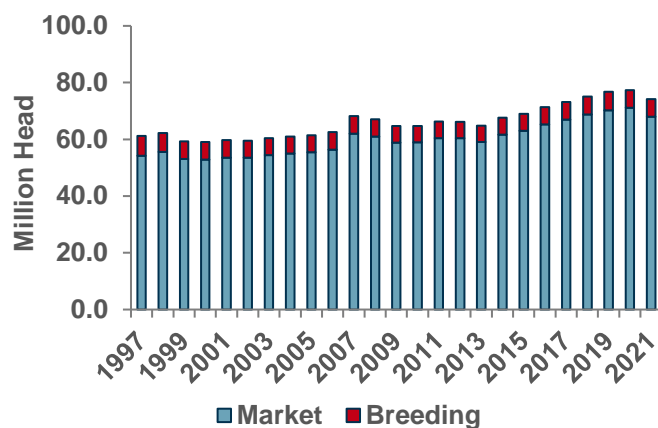
Introduction

The U.S. pork industry represents a significant value-added activity in the agricultural economy and a major contributor to the overall U.S. economy. The \$28.02 billion of gross cash receipts from hog marketings in 2021 represents only a portion of the total economic activity supported by the industry. Although the size and structure of the U.S. pork industry has changed over time, increased levels of production have supported jobs and generated earnings in the national economy. An estimated 613,823 U.S. jobs are involved in various aspects of the pork value chain — ranging from input suppliers to producers to processors and handlers as well as main street businesses that benefit from purchases by people in these industries. Overall, an estimated \$35.86 billion of personal income and \$57.20 billion of gross national product are supported by the U.S. pork industry based on 2021 levels of production.

This report documents trends in U.S. pork production and examines the current structure of production, input purchasing, and processing of the pork industry in the United States. The contribution of these activities to the overall economy in terms of employment, income and value added is also estimated and presented in detail.

Hog Farms and Production

Figure 1: U.S. Hog Inventory, Dec. 1

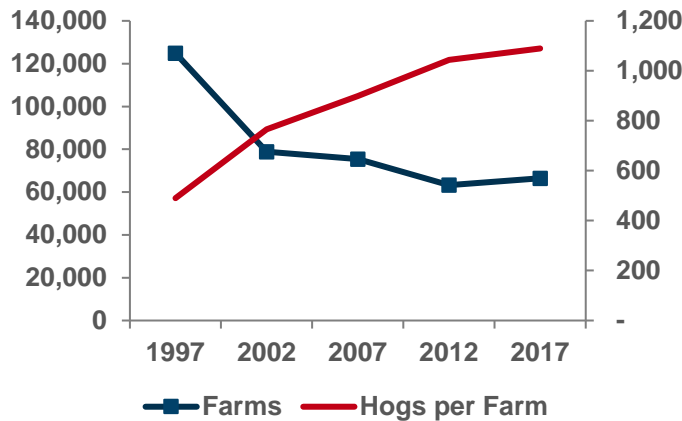


Source: USDA-NASS Hogs and Pigs Report

Hog inventories in the United States have varied cyclically over time but have trended upward from 59.11 million head in 2000 to 74.15 million head in December 2021 (Figure 1). Annual cash receipts from the sale of hogs were \$28.02 billion in 2021, up 46.2% from the previous year. This figure was based on a pig crop of 132.95 million born in the United States and in-shipments from Canada of 4.98 million feeder pigs fed in the United States and 1.55 million market hogs and slaughter sows and boars processed in U.S. packing plants.

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Figure 2: U.S. Hog Farms and Hogs per Farm



Total hog marketings in the United States have increased in recent years along with the number of farms raising hogs. From 1997 to 2012, the number of farms with hogs decreased from 124,889 to 63,246, but by 2017 the number of farms increased to 66,439 (Figure 2). Meanwhile, the average inventory of hogs per farm has increased from 490 to 1,089.

Source: USDA-NASS Census of Agriculture, 2017

Figure 3: U.S. Hog Inventory Distribution

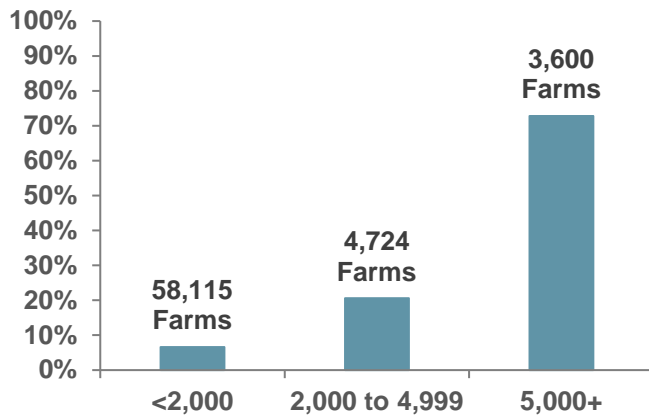


Figure 3 illustrates the distribution of the U.S. hog inventory. About 7% of U.S. hogs are on farms with less than 2,000 head in inventory, 20% of the inventory is on farms with 2,000 to 4,999 head, and 73% are on farms with 5,000 or more hogs. Compared with the 2012 Census of Agriculture, there are now about 2,600 more farms in the smallest size category, six more farms in the middle category, and almost 600 more farms with inventories greater than 5,000 hogs.

Source: USDA-NASS Census of Agriculture, 2017

The prominence of the U.S. pork industry and its growth in the global pork export market is no accident. Competitive production of feed grains, significant natural resources and industry infrastructure have allowed the United States to position itself as an efficient producer for both domestic and global pork consumers. Because this report is concerned with the impacts and resources used in pork production, the analysis focuses on the value of hogs produced in the United States as the critical measure that drives expenditure levels for various hog-related inputs and investments.

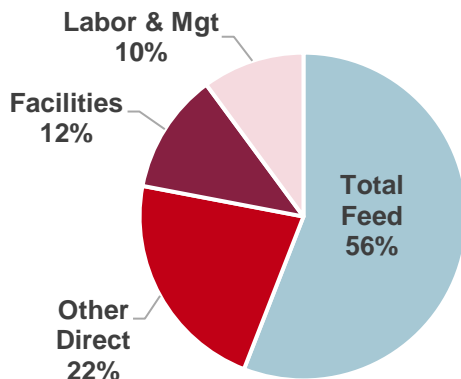
Hog Production Costs and Returns

The \$28.02 billion of hog marketings in 2021 represents the aggregate value of the pork industry at the farm level. In addition to these farm-level effects, the industry's backward and forward linkages generate significant additional impacts throughout the U.S. economy. The backward linkages include purchased inputs, supplies and services used by hog producers. The forward linkages include further value-added activities occurring after the farm gate, such as slaughter, processing and food preparation. Total inputs, including labor, used by the U.S. hog industry were estimated based on aggregated cost of production budgets weighted according to the share of hog production occurring in different types and sizes of production systems.

Different budgets representing three sizes of farrow-to-finish operations were developed. While some producers in the U.S. may specialize in breed-to-wean or wean-to-finish operations, the industry as a whole operates as farrow-to-finish with the exception of a relatively small percentage of pigs imported from Canada. The farrow-to-finish operations were categorized by size because hog production is subject to economies of scale where per unit input use declines as operations increase in size. The share of U.S. pork production estimated to be in each classification of facility was based on the percent of inventory in three size groups reported in the 2017 Census of Agriculture and reflected in Figure 3.

The cost of production and input usage was then calculated for each size of farrow-to-finish operation based on cost of production budgets developed by Iowa State University Extension and Outreach and were updated to reflect rising nonfeed variable and fixed costs. The weighted cost and returns of production and totals of feed use, other direct inputs, annual depreciation on capital investments, labor requirements and returns to management and capital are presented in Table 1 and summarized in Figure 4. These aggregates are also depicted schematically in Figure 5. The prices used in the analysis are intended to reflect long-run conditions in the industry and are based on 10-year projections made by the Food and Agricultural Policy Institute (FAPRI) in March 2022. Based on these long-run prices, annual revenue from hogs is estimated to be \$24.3 billion.

Figure 4: Estimated Share of Production Costs



Estimating the labor component involved in hog production presents a special challenge due to limited employment data being reported at the farm level and the mix of farm operators and employees involved in production. Because we are most interested in measuring labor on a comparable per unit basis, a full-time equivalent (FTE) of 2,080 hours per year per worker was deemed to be the most appropriate measure of

labor. This FTE standard was then applied to the total hog production in each size classification in the nation and then summed to arrive at a total labor requirement.

The rate of FTE labor required per 10,000 hogs raised in farrow-to-finish operations ranged from 4.5 for the small facilities to 2.9 for the medium-scale facilities to 2.3 for the large systems.

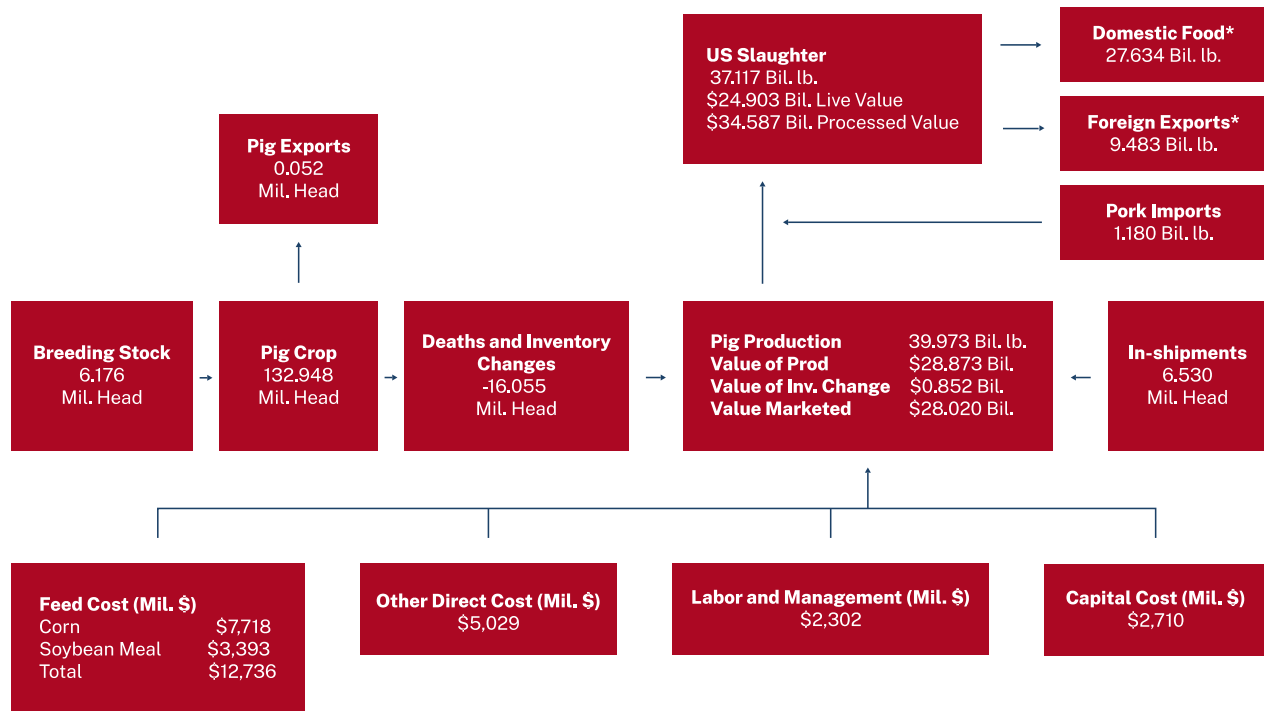
Although an estimated 66,439 farms are reported to be involved in hog production in 2017, based on the FTE standard of these budgets, an estimated 36,035 workers are required to produce the current volume of hogs in the United States (Table 1). While the converted FTE numbers are used in our economic impact estimates, it is important to recognize the larger number of U.S. farms involved in some level of pork production.

The lower level of the schematic in Figure 5 represents purchased cash inputs used by producers at the farm level. In most hog-producing states, a significant portion of purchased inputs are produced within the state, generating additional economic activity in the local economy.

The estimated total value of direct inputs used in the United States sum to \$17.8 billion based on long-run feed prices. Additional costs for depreciation of fixed assets and facilities total an estimated \$2.7 billion. Labor and management expenses add an additional \$2.3 billion of costs for a total of \$22.8 billion of aggregate input costs used in hog production in the United States. The residual value between inputs and revenue is estimated to total \$1.5 billion and can be described as returns to capital.

The largest single category of expenditure is feed. With 140.1 million head produced annually, 1.6 billion bushels of corn valued at \$7.72 billion are used in the United States. The 1.6 billion bushels of corn represent 10.8% of the U.S. corn crop in 2021. The 10.5 million tons of soybean meal valued at \$3.39 billion used in hog production represents the meal production from 433 million bushels of soybeans, or 9.8% of the 2021 U.S. soybean crop. The remaining feed supplements and additives represent another \$1.62 billion of purchased inputs from suppliers in the United States. Overall, the use of this scale of feed ingredients helps support the soybean processing industry, local elevators, transportation services, and others based in local communities.

Figure 5. U.S. Pork Industry Estimated Production Flows, 2021 Production Year



*Final demand estimates based on prorating U.S. slaughter (lbs) proportionately to total end uses.

Table 1. Cost of Production and Returns Associated With U.S. Average Farrow-to-Finish Operation, Long-run Prices and 140.1 Million Head Marketed

*10-year projections made by the Food and Agricultural Policy Institute (FAPRI) in March 2022.

	Units	Avg. per Litter	Total
Marketings	10.556/litter		13,273,871
REVENUE*	\$60.83/cwt	\$1,830	\$24,291,081,912
COST			
Corn (\$/bu)	\$4.71/bu	\$581	\$7,718,469,218
Soybean Meal (\$/ton)	\$323.03/ton	\$256	\$3,393,131,368
Other Feed (\$/cwt)	\$43.00/cwt	\$122	\$1,624,670,858
TOTAL FEED		\$959	\$12,736,271,444
Other Direct Cost		\$379	\$5,029,030,593
TOTAL DIRECT		\$1,338	\$17,765,302,036
Equipment		\$42	\$552,426,549
Building		\$151	\$2,010,894,363
Land		\$4	\$55,671,615
Other		\$7	\$91,079,871
Labor		\$132	\$1,747,544,589
Management		\$42	\$554,269,602
TOTAL INDIRECT		\$378	\$5,011,886,589
TOTAL COST		\$1,716	\$22,777,188,625
RETURN TO CAPITAL		\$114	\$1,513,893,287

Input Summary		
Corn	Bu	1,637,335,539
Soybean Meal	Tons	10,504,318
Other Feed	Cwt	37,783,043
Labor & Mgt. per Hog	\$/head	\$16.43
Total Labor	FTE	36,035

Economic Contribution of U.S. Pork Industry

In addition to the direct sales and purchases described above, the U.S. pork industry generates further activity through its backward and forward linkages to other industries. Backward linkages include purchases of inputs, supplies, trucking and other services required to produce hogs, while forward linkages are tied to the hog slaughter and pork processing industries. When hog producers and pork processors make purchases from other industries, these expenditures support additional jobs and earnings beyond the pork industry and induce spending in a variety of sectors.

To capture the total economic contribution of the pork industry, this analysis uses a modified input-output (I-O) model of the United States within the IMPLAN modeling system. IMPLAN is a customizable system that utilizes a 546-industry matrix and an extensive database to account for all inter-industry transactions within the economy and calculate the impact of an initial industry change. When measuring the overall contribution of an entire industry, the final estimates essentially quantify the impacts that would be lost if the pork industry was removed from the U.S. economy.

The I-O model for the United States was driven by estimates of 2021 hog marketings, the employment level and production costs calculated in the previous section and estimates for employment and labor income within the hog slaughter and pork processing industries. For this portion of the analysis, FTE employees were converted to the annualized equivalents used by IMPLAN. Estimates for the hog slaughter and pork processing industries were based on plant location and size information from federal and state inspection agencies, employment information from the U.S. Census Bureau, and state slaughter and production estimates produced by USDA. Because the IMPLAN-defined industries that represent hog production and pork processing include additional activity such as other animal production and beef processing, providing these industry-specific inputs helps customize the model for the pork industry.²

After initial industry values were estimated, the model was carefully modified to avoid double-counting the upstream impacts of hog production and to eliminate buybacks within and across the industries of interest. For example, the hog slaughter industry purchases live hogs as an intermediate input. The economic value of hog production is

² This analysis uses IMPLAN's industry 14 (animal production except cattle, poultry and eggs), industry 89 (animal, except poultry, slaughtering) and industry 90 (meat processed from carcasses). To further customize the model, purchases of beef cattle were removed from industry 89 and industry 90 spending patterns and then output was derived from intermediate inputs (live hogs plus other nondurable goods) and labor costs.

already fully accounted for as part of this analysis, so the model was adjusted to include only the additional value generated by slaughter and processing activity. The model also excludes additional effects from intra-industry purchases (e.g., hog producers buying feeder pigs, breeding stock, etc.) and purchases from the other industries being analyzed (e.g., the further processing industry purchasing carcasses from the slaughter industry).

After making these adjustments, the I-O model was run to calculate the multiplied-through effect of the entire pork industry on the U.S. economy. The total contribution includes the direct, indirect, and induced values for the output, labor income, value added, and jobs supported by the industry. Direct impacts are the initial values of sales and employment in the industry, indirect impacts stem from expenditures on inputs, and induced impacts are supported by purchases made with income earned in the direct or indirect industries. The results of this analysis are summarized in Table 2.

Table 2. Total Economic Contribution of Hog Production and Pork Processing Industry

	Jobs	Labor Income	Value Added	Output
Direct	180,086	\$9,815,602,917	\$13,749,321,890	\$86,026,670,285
Indirect	237,694	\$14,646,319,848	\$23,227,444,439	\$56,480,193,464
Induced	196,044	\$11,394,651,234	\$20,222,501,121	\$35,857,541,459
Total	613,823	\$35,856,573,999	\$57,199,267,451	\$178,364,405,208

Source: IMPLAN Model for the United States with inputs calculated by the user.

Output, or gross sales, measures the value of production within an industry and is the broadest measure of economic activity. The estimated \$28.02 billion in gross output, or sales, from hog production in 2021, supported additional sales in the state’s hog slaughtering and processing sector, as well as additional input purchases and spending that totaled \$178.36 billion of direct, indirect, and induced sales in the U.S. economy. In this analysis, total output excludes the indirect effects of purchased hogs and carcasses. However, this number should be used with caution because the value of the hog is still counted twice, both at the producer level and as part of the total value of pork sold at the processor level.

Value added is often a preferred measure of economic activity because it includes only the portion of output that exceeds the cost of intermediate inputs used in production, therefore eliminating the double-counting issue described above. This includes wages, taxes and profits, and this represents the industry’s contribution to gross domestic product (GDP). Overall, an estimated \$57.20 billion of value added in the U.S. economy

is linked directly and indirectly to the pork industry. Value added grows when sales and personal incomes increase faster than the cost of intermediate inputs.

The U.S. pork industry supports a total of \$35.86 billion in labor income paid to 613,823 workers across many industries. This includes the 36,035 FTE workers at the farm level and an estimated 138,018 employees in the hog slaughter and processing sectors. The estimate of \$2.30 billion in direct labor income within the hog production industry includes wage and salary income as well as proprietor income. An estimated \$6.92 billion is also paid to workers in the slaughter and processing industry. The pork industry supports additional jobs within agriculture and manufacturing, as well as in industries like trucking, finance, insurance, real estate, trade and other service sectors. Estimates of the pork industry's total contribution are presented at an eight-sector level of detail in Table 3.

Table 3. Total Impact by Industry Group

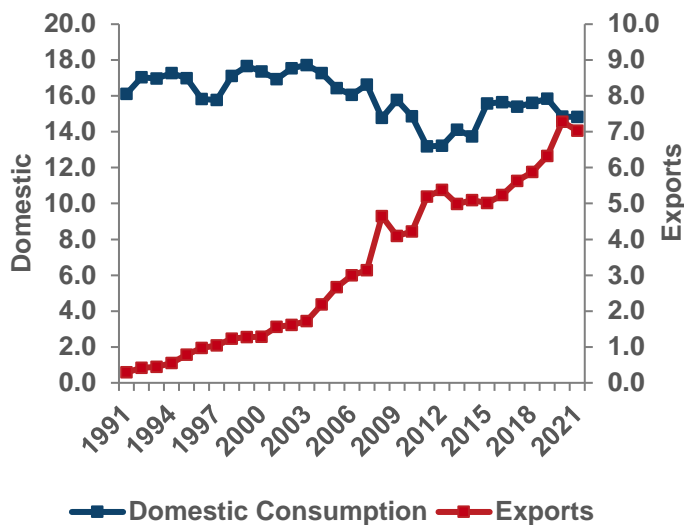
	Jobs	Labor Income	Value Added	Output
Agriculture	122,402	\$6,142,517,636	\$9,851,858,997	\$38,116,873,655
Construction	2,999	\$202,853,114	\$300,243,234	\$662,147,684
Manufacturing	161,929	\$8,847,970,101	\$12,311,923,411	\$79,393,401,872
Wholesale and Retail	58,432	\$3,779,599,554	\$6,955,824,535	\$11,734,702,408
Transport and Utilities	51,280	\$3,507,768,340	\$5,018,583,159	\$9,879,300,964
Finance, Ins., Real Estate	39,190	\$2,303,278,200	\$4,907,371,814	\$10,289,723,413
Services	171,506	\$10,406,989,766	\$16,809,141,722	\$26,253,383,055
Other	6,086	\$665,597,289	\$1,044,320,579	\$2,034,872,157
Total	613,823	\$35,856,573,999	\$57,199,267,451	\$178,364,405,208

Source: IMPLAN Model for the United States with inputs calculated by the user.

Pork Exports

The continued growth of the U.S. hog inventory is feeding growing demand from domestic and export customers (Figure 6). Compared with 1990, domestic consumption in 2021 was 951.4 million pounds less, an amount equal to about 3% of 2021 production. However, exports were 6.8 billion pounds higher than in 1990, totaling \$8.1 billion dollars in value and adding over \$62 per head in value to each hog marketed.

Figure 6: Pork Consumption and Exports, Billion lb.



Source: USDA World Supply and Demand Estimates

In 2021, about 25% of U.S. pork production was exported. Using this export share implies that a comparable share of the total economic contribution, or 155,847 jobs and \$9.10 billion of personal income in the U.S. results from exporting pork and pork products to foreign markets.

The final demand uses of processed pork products in 2021 were an estimated 7.03 billion pounds going into foreign markets and 14.83 billion pounds into domestic markets. These estimates are based on prorating the U.S. production proportionally to total end uses.

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Pork Industry Issues and Opportunities

The pork industry has undergone significant changes over the last several decades, transforming from a commodity-oriented industry that relied largely on family labor to a more capital-intensive, science-and-technology-driven industry producing products for many diverse consumers. The industry also faces considerable challenges in the coming years as it works to capture opportunities of increased consumer expectations and expanding markets for U.S. pork.

Industry Size and Structure | The average U.S. farm size has increased in recent years, though the trend toward fewer farms has slowed. In fact, from 2012 to 2017, the number of hog farms in the United States increased by almost 3,200. However, as global market conditions and competing demand for feed grain inputs push production costs higher, effective marketing, financial planning and risk management strategies are becoming necessary ingredients for industry survival. Producers of all sizes are asking if they are large enough, and contract production arrangements are becoming increasingly popular. It remains true that effective management is key to success regardless of farm size or structure.

The family farm remains the dominant business structure for the U.S. hog industry. Family farms comprise 96% of all U.S. farms with hogs and account for 81% of the hog inventory, according to the 2017 Census of Agriculture Farm Typology report. Regardless of the size or ownership of the enterprise, hog and pork production does create economic activity in the state and community where it is located. If the firm is not locally owned, the profits may not remain entirely in the community. However, major inputs (feed, labor, utilities, trucking, services, property taxes, etc.) will likely still be provided locally or within the region.

Animal Health and Biosecurity | Domestic disease pressure has heightened in recent years, which has led to a lag in productivity growth (pigs per litter, farrowings per sow, etc.). Staying prepared and having well-thought-out animal health and biosecurity programs in place remain critical to protecting against new, emerging and foreign diseases. Genetic technology has advanced in recent years, and reducing disease pressures may allow potential productivity gains to be realized. In addition, the industry must remain diligent in its efforts to prevent an outbreak of African swine fever (ASF) in the United States. Such an outbreak would be a devastating animal health crisis with extremely negative implications for market prices, export opportunities and the overall economy.

Worker Shortages | Increased levels of production and the adoption of new technology have supported a greater demand for skilled, full-time workers on hog farms. Pork packing and processing plants also require more workers to operate at full, optimal capacity levels. However, maintaining adequate staffing levels on farms and in processing plants has been increasingly difficult in recent years despite higher wage offerings, bonus programs and competitive benefits.

While current tightness in the broader U.S. labor market plays a role, many labor challenges are tied to long-term demographic trends in rural America. Slowing U.S. population growth and increased levels of outmigration have caused populations of rural, farming counties to decline over time while the median age of the rural workforce continues to increase. The result is a shrinking and aging rural labor force that is increasingly unable to fill the workforce needs of the pork industry.

Current visa programs that allow foreign-born workers to fill on-farm job openings in other industries are not well-suited for an industry that requires year-round animal care and technical support. Without policy intervention, labor shortages threaten to limit pork production in the years to come, undermining an important sector of the economy.

Exports and Trade | Exports are an important component of overall pork demand. The United States is 1 of 3 top pork producing and exporting countries in the world, accounting for about 26% of global pork exports in 2021. Despite rising breakeven price levels in recent years, the U.S. remains a relatively low-cost producer with significant natural resources and has been a reliable supplier amid worldwide supply chain issues. These are all important considerations for global buyers.

More than 25% of all U.S. pork is exported, adding over \$62 per head to the value of each hog marketed. Expanding market access by removing nontariff trade barriers for U.S. pork will be important for future industry growth. Relationships with major trade partners must be solvent for trade to remain the important component it is.

Environment and Sustainability | The environmental impact of pork production is an important matter that is not independent of the industry's economic contribution. The most recent retroactive life-cycle assessment of the pork industry shows that U.S. producers have significantly reduced the resources required to produce each pound of pork. According to the U.S. Environmental Protection Agency, hog production accounted for 0.47% of total U.S. greenhouse gas emissions in 2020, making the industry's carbon footprint per pound of pork produced nearly 21% smaller than in 1990.

Because of differences in climate, cropping patterns and manure management practices across the country, uniform environmental standards may have differing regional impacts on hog production. For this reason, the pork industry's sustainability goals and metrics are focused on outcomes rather than specific practices.³ As a whole, the pork industry has established goals to continue improving water-use efficiency, soil, land, biodiversity and nutrient management while further reducing the industry's carbon footprint by 2030.

Opportunities for Value-added Production | Markets for products with specific attributes (e.g., organic, antibiotic use, animal housing specifications, etc.) have expanded in recent years. As demand for these types of products increases, different segments of the marketing channel must communicate more closely with one another. This communication, whether formal (via specification contracts) or informal (through market signals) will coordinate to deliver specific characteristics for a given product line.

Process-verified programs present additional value-added opportunities for the pork industry. However, it is important that any market growth be based on consumer demand for differentiated products rather than imposed regulations, which inflict significant costs and inefficiencies on producers and the entire pork value chain. Each individual producer will face decisions at the farm level about which product channels they will supply based on the costs and incentives to produce.

Looking Ahead | The future size and structure of the U.S. pork industry will be determined by the individual decisions of more than 60,000 farms, the devoted individuals who operate them and their potential successors. With current demographics, including producer age and an equity distribution skewed to older producers, a large share of productive assets in the pork industry will likely change hands over the next decade. Future policy and educational efforts should be designed not only to encourage and assist beginning farmers entering pork production but also to address long-run challenges and enhance their chances of surviving, prospering and growing as viable farm operators.

³ For more information, see the [2021 Pork Industry Sustainability Report](#).

References

Food and Agricultural Policy Research Institute. U.S. Agricultural Outlook. FAPRI-MU Report #02-22. University of Missouri. March 2022.

IMPLAN Group LLC. IMPLAN model, 2019/2020 data with inputs provided by the user.

Iowa State University Extension and Outreach. Estimated Livestock Returns.

Iowa State University Extension and Outreach. Livestock Enterprise Budgets for Iowa - 2021. Ag Decision Maker B1-21.

Purdue University. 1995. Positioning Your Pork Operation for the 21st Century. Purdue Cooperative Extension Service. ID-210.

University of Minnesota Center for Farm Financial Management. FINBIN | The Farm Financial Management Database.

U.S. Census Bureau. County Business Patterns. CBP Tables 2020.

U.S. Department of Agriculture. World Agricultural Supply and Demand Estimates.

U.S. Department of Agriculture Economic Research Service. Commodity Costs and Returns.

U.S. Department of Agriculture National Agricultural Statistics Service. Hogs and Pigs.

U.S. Department of Agriculture National Agricultural Statistics Service. Livestock Slaughter Annual Summary 2021. April 2022.

U.S. Department of Agriculture National Agricultural Statistics Service. 1997, 2002, 2007, 2012, 2017 Census of Agriculture. United States Summary and State Data. Volume 1—Geographic Area Series—Part 51.

U.S. Department of Agriculture National Agricultural Statistics Service. 2017 Census of Agriculture. Summary of Farm Typology Measured by Gross Cash Farm Income (GCFI) of Family Farm Producers and Non-Family Farms - United States.

U.S. Department of Agriculture National Agricultural Statistics Service. Meat Animals Production, Disposition, and Income 2021 Summary. April 2022.

U.S. Environmental Protection Agency. Greenhouse Gas Inventory Data Explorer. 2020.

U.S. Department of Agriculture National Agricultural Statistics Service. Meat Animals Production, Disposition, and Income 2021 Summary. April 2022.

U.S. Environmental Protection Agency. Greenhouse Gas Inventory Data Explorer. 2020.

U.S. Food Safety and Inspection Service. Meat, Poultry and Egg Product Inspection Directory.