PENNSYLVANIA AGRICULTURE

A LOOK AT THE ECONOMIC IMPACT AND FUTURE TRENDS

JANUARY, 2018

TEAM PENNSYLVANIA

pennsylvania
DEPARTMENT OF AGRICULTURE

A REPORT BY

ECONSULT SOLUTIONS
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Agriculture has played an important role in our culture and our economy since the earliest days of our commonwealth. At one point over half our residents lived on farms, but today, fewer than two percent of our state's population are engaged in production agriculture. Those two percent are incredibly productive thanks to hard work, science and innovation, and increasingly advanced technology.

Indeed, Pennsylvania in many respects is a national leader in food and agriculture, and it is in the commonwealth's interests to ensure the industry remains a vibrant part of the state's economy. It is with this goal in mind that we began a process over a year ago to take a fresh look at how we can best build on our collective strengths and plan for a strong future for Pennsylvania agriculture.

The following report is the result of a public-private partnership that has brought together agricultural business leaders from throughout the commonwealth. Following the collaborative philosophy of Team Pennsylvania, we believe Pennsylvania can maximize its world-class resources by injecting private sector thought and vision into the valuable public-sector work of the Pennsylvania Department of Agriculture. To launch this partnership, leaders of the state's agriculture and food industries—from crop and animal production to food and beverage manufacturers, foresters, landscapers and horticulturalists--from throughout the Commonwealth came together to form an Agricultural Advisory Board. Over the past year, members have worked to develop a shared vision and strategic priorities for Pennsylvania's agriculture sector.

As a first step, we commissioned the following in-depth analysis and study of Pennsylvania's agricultural economic impact, as well as recent trends influencing the industry's direction. The pages that follow take that information to further define recommendations that will inform our future economic development efforts.

We are excited to unveil our hard work and fully recognize that this is just the beginning. We have the data. We have sound recommendations. Now, we need your engagement.

By working together, we will advance Pennsylvania's agriculture sector and increase the commonwealth's competitiveness in regional, national and global marketplaces—ensuring this industry remains a vibrant part of our state for generations to come.

Thank you.

Sincerely,

Russell C. Redding
Secretary
Pennsylvania Department of Agriculture

Ryan C. Unger
President and CEO
Team Pennsylvania

EXECUTIVE SUMMARY

The agriculture industry is a major employer and contributor to the Commonwealth's economy. Agriculture generates employment and economic activity on 59,000 farms and in every county in the Commonwealth. On-farm agriculture production underpins a large food processing industry and agriculture support services located throughout the state, including bakeries, confectioners, dairy and meat processors, and snack food manufacturers, among others. Pennsylvania's equine industry includes some of the top breeding farms nationwide and supports a strong racehorse industry. The state's forest products sector is grounded in hardwoods production, where Pennsylvania ranks first in export grade hardwood.

Pennsylvania's diverse and innovative agricultural industry has made the Commonwealth a national leader in sectors throughout the industry. In addition to leading the country in export grade hardwoods and mushroom production, Pennsylvania ranks among the top five states for poultry layers, milk from cows, Christmas trees, and the nursery, greenhouse, floriculture, and sod sectors. Between 2002 and 2012, several sectors experienced rapid growth, well above national averages. During this time period, the number of farms in Pennsylvania with broiler chickens increased 13 percent and the number of chickens grew by 26 percent, compared to 3 and 0 percent growth nationwide, respectively. Corn for grain bushels grew by 138 percent in Pennsylvania, compared to a 20 percent growth across the United States, and soybean production in the state grew by 159 percent compared to an 8 percent national growth rate.

Shifting consumer demand for organic products has driven a rise in organic agriculture in Pennsylvania. As the organic segment of Pennsylvania agriculture has rapidly expanded, the Commonwealth has become a national leader in organic food production. Since 2008, Pennsylvania has risen from third to second nationally in organic farm sales, and from sixth to fourth in the number of organic farms. Pennsylvania leads the nation in food-processing companies, with more than 2,300 operating across the state. The strength of the food-processing sector supports Pennsylvania's leading-state status in the value of shipments of canned fruit and vegetable specialty products, chocolate and cocoa products, potato chips, and pretzels.

Agriculture in PA Supports

280,500 Direct Jobs	**$10.9B** Direct Earnings	**$83.8B** Direct Output
579,000 Total Jobs	**$26.9B** Total Earnings	**$135.7B** Total Output

Defining Agriculture

The definition of agriculture used in this report was determined through conversations with PDA and agricultural industry leaders. The report's definition and analysis represent the first comprehensive look at the state's agriculture industry, with the landscaping, forestry and hardwoods, equine, and food manufacturing sectors included.

1. **Crop and Animal Production**: includes grain, vegetable, fruit, mushroom, nut, tobacco, custom crop harvesting, and all other crop production industries in addition to beef, poultry, dairy, egg, and all other animal production industries. All other animal production includes the production of farm, pleasure, work, and race horse production. Crop production includes nursery and tree production, including Christmas tree production. Also included are all support activities for agriculture and forestry, based on NAICS code classifications that include forestry support services as agriculture support services. Agricultural support services include farm management, machine crop harvesting, milk testing, stud and breeding services, pedigree record services, and support services for the equine industry: breeding, board, training, and horseshoeing. Forestry support services include forest thinning, forest pest control services, and forest management plans preparation.

2. **Food and Beverage Processing and Manufacturing:** includes all industries related to the processing of crops and animals, including pork, poultry, beef slaughtering and processing, dairy product manufacturing, fruit and vegetable preserving, oils, chocolate, cereals, and juices, and food manufacturing, such as bread, nut butter, pasta, syrup, and other snack food manufacturing in additional to coffee, tea, beer, soft drink, and wine manufacturing.

3. **Forestry**: includes all industries related to the production and processing of forest products and commercial logging, including timber tract production sawmills, veneer and plywood manufacturing, pulp and paper mills, and wood furniture and cabinet manufacturing.

4. **Landscaping**: includes the landscape and horticultural services industry, which includes businesses that provide landscape care and maintenance services and that install trees, shrubs, plants, lawns or gardens. Businesses in this industry also design plans and construct walkways, retaining walls, decks, fences, ponds and similar structures.

ECONOMIC IMPACT

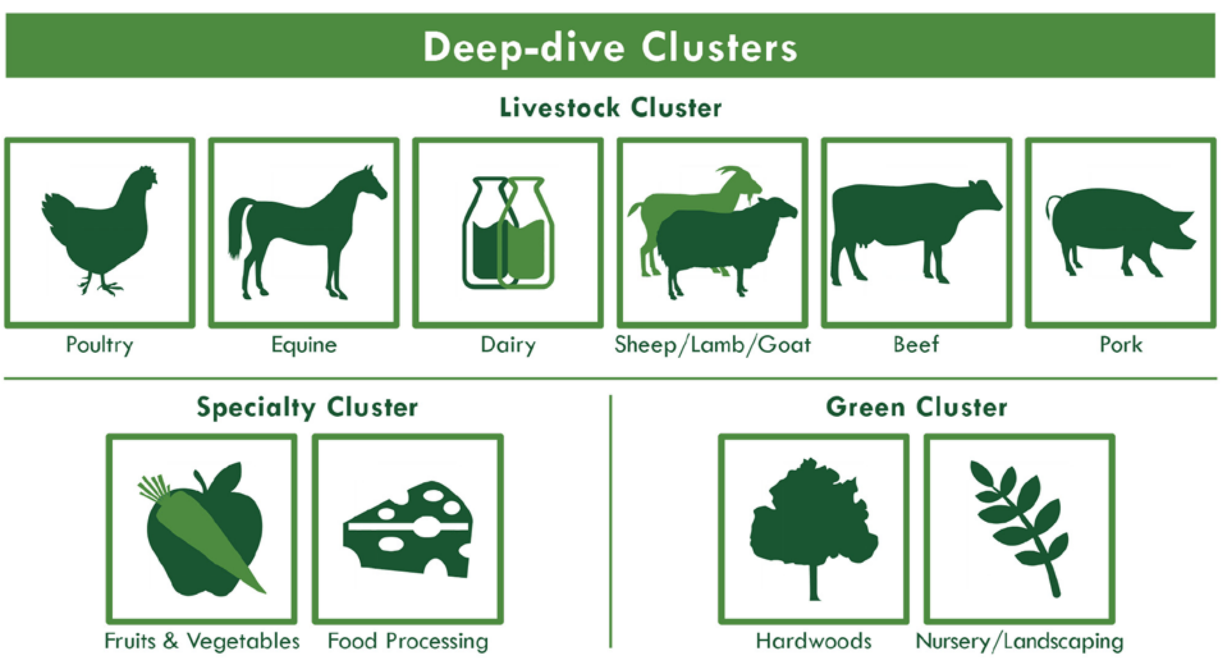
Pennsylvania agriculture is a major driver of the state's economy. In addition to crops and animals raised on farms, the industry includes forestry and forest products, as well as agricultural support services and agricultural product processing and food manufacturing. As with any industry, the scale of the sector goes beyond the market value of its products. Beyond the sectors that comprise the industry, direct spending in agriculture ripples out through the economy, creating indirect and induced economic impacts and supporting jobs throughout the state.

Agriculture accounts for approximately $83.8 billion in direct economic output, including $22.8 billion in value-add. It supports over 280,500 jobs and $10.9 billion in earnings. Within the agriculture sector, food processing and manufacturing is the largest sub-sector, accounting for nearly 60 percent of the economic output and 32 percent of the total direct employment. The production of crops and animals accounts for approximately 10 percent of the total direct output ($9.2 billion), but generates 29 percent of the total direct employment.

Looking at the direct impacts of the industry alone does not tell the full story of agriculture's importance to the Commonwealth's economy. There are inter-industry linkages between the agricultural sectors and other sectors of the economy that generate spillover impacts. These multiplier impacts, combined with the direct impacts, provide the complete picture of the agricultural sectors contribution to the state's economy. We used standard input-output modeling techniques to estimate the full range of economic, employment, and employee compensation impact associated with the direct activity attributable to the agriculture industry in the Commonwealth of Pennsylvania.

Agriculture supports 1 out of every 10 jobs in Pennsylvania.

The agricultural industry generates approximately $135.7 billion in total economic impact each year and supports 579,000 jobs with $26.9 billion in earnings. For each job directly supported by Pennsylvania agriculture, another 1.06 jobs are supported across the Commonwealth. For each dollar of direct output, another $0.62 is generated in economic impact.



Study Overview

The purpose of this report is three-fold. First is to provide an updated accounting of the economic impact of the agriculture industry in the Commonwealth. The second is to inform the roadmap for the agricultural industry by identifying where it can build on its existing strengths and capitalize on new opportunities. The third purpose is to provide industry and policy recommendations to help the industry adapt to the macro trends it is facing. Together, these analyses will support the Pennsylvania Department of Agricultural (PDA) and Team Pennsylvania (Team PA) in developing a proactive, shared vision and strategic plan for Pennsylvania's agricultural sector.

Agriculture has a long history as a strong, successful industry and major contributor to Pennsylvania's economy. In order to ensure the continued strength and success of the industry, PDA partnered with Team PA and the Agricultural Advisory Board to develop a 10-year strategic plan for the industry. The goal of this process is to develop a blueprint that will bring stability and guidance to every sector of the industry.

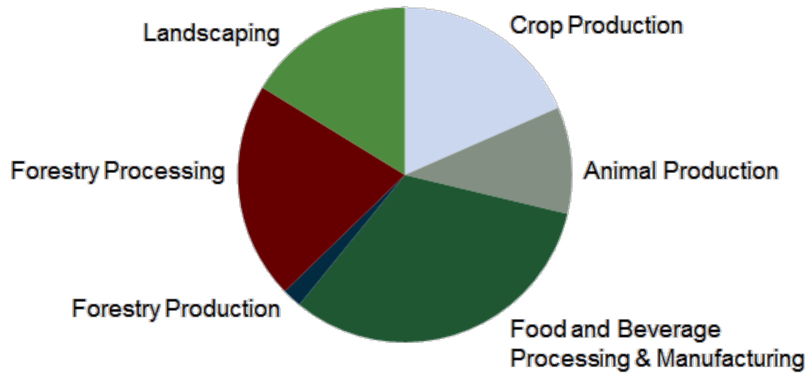
The strategic plan process was structured to prevent the influence of predetermined biases and to build a collective vision for the future of the industry by bringing together agricultural leaders from across sectors and across the state. The process formally began with a series of seven agricultural industry listening sessions held between November 2015 and January 2016. The sessions brought together 140 industry leaders from across the state and were led by facilitators from Telos, an independent business consulting firm, to ensure industry was driving the discussions. The major themes identified and questions posed in the listening sessions form the foundation to support PDA and Team PA in the development of the 10-year strategic plan for the industry. The strategic plan will help both industry and policy makers build a better future for agriculture in Pennsylvania.

As part of the broader strategic planning process, this report integrates two methodological approaches – modeling the economic impact of the state's agricultural industry and micro sub-sector analyses – to provide a greater level of detail about critical sectors. The economic model utilizes 2015 data, the most recent year for which comprehensive data is available. The sub-sector analysis was undertaken for ten sectors chosen through consultation with Team PA and PDA. The analysis mapped the supply and value chain for each sub-sector, explored the nature and size of demand, examined competitor dynamics, and analyzed how changes in social, political, economic and technological context might change demand, competitive dynamics or supply chains. The insights from the economic impact and sector analyses were then integrated to identify common trends, note general and sector-specific business opportunities, and develop industry and policy recommendations.

Direct Jobs

280,500

Total Direct Jobs



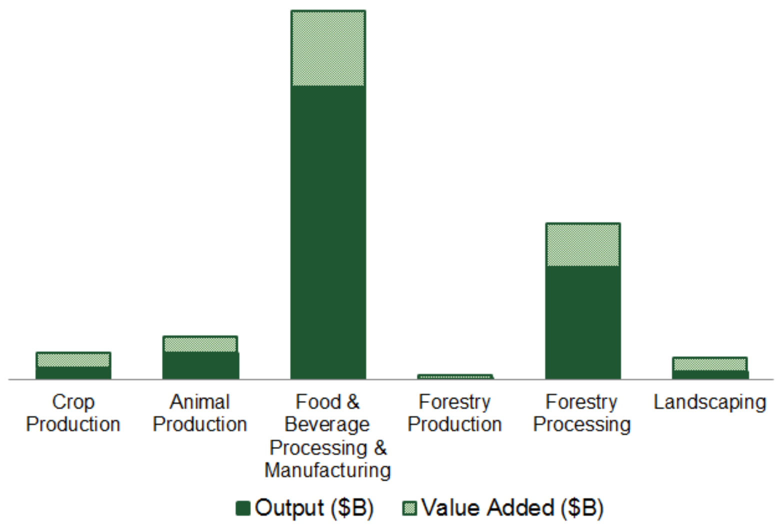
Direct Output

$83.8 Billion

Total Direct Economic Output

$22.7 Billion

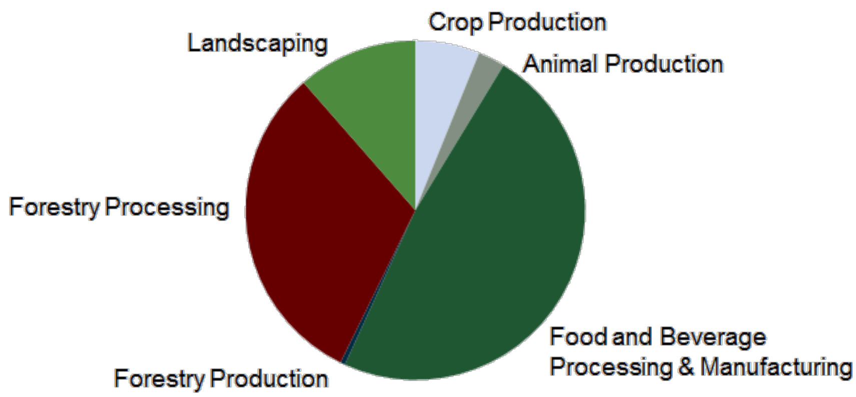
Total Direct Value Added

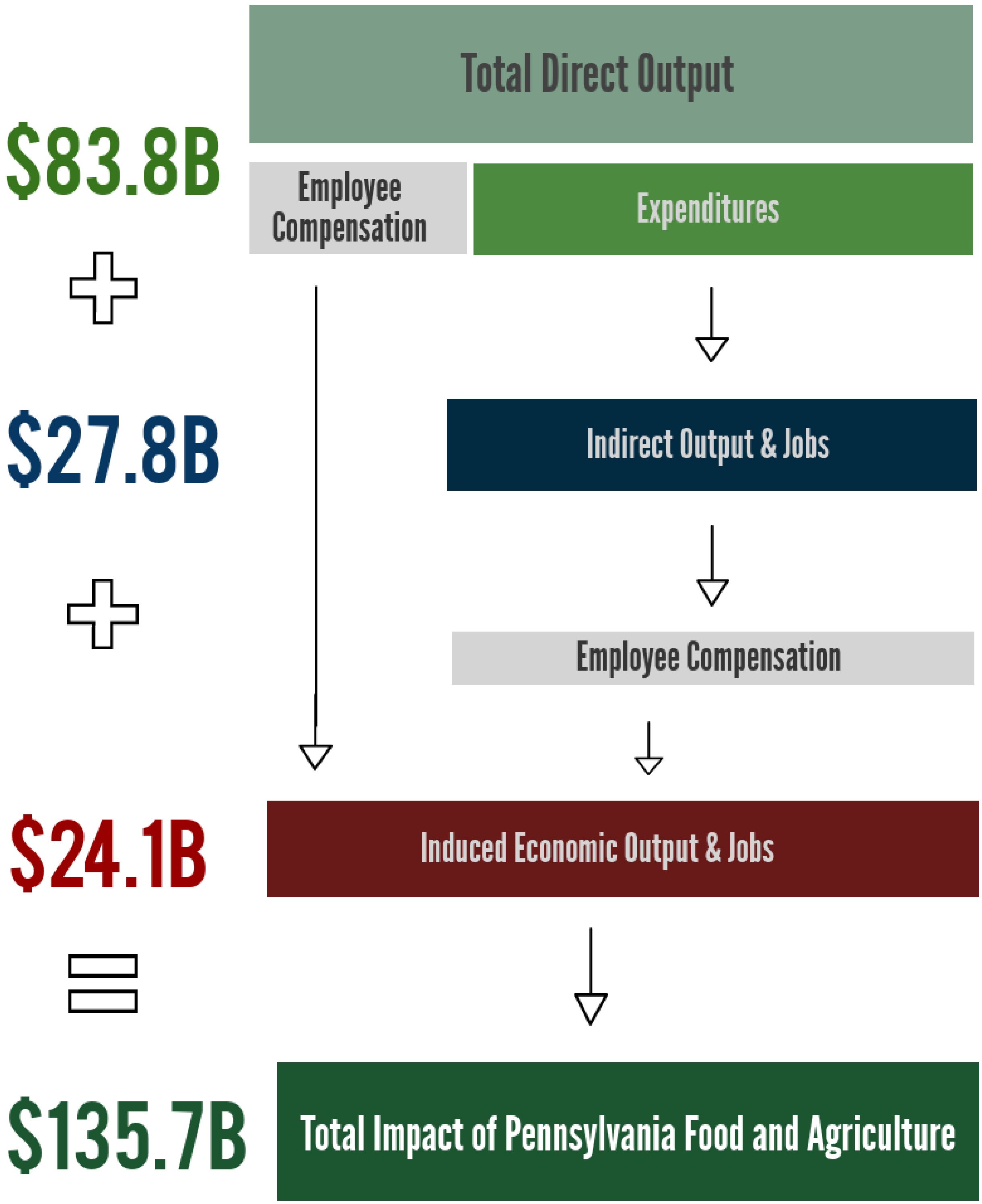


Direct Earnings

$10.9 Billion

Annual Wages & Salaries Supported





Source: IMPLAN (2015), Piktochart (2017)

SWOT Analysis

Pennsylvania's agricultural sector is competing in a constantly evolving and increasingly competitive global market. In order to understand how national and regional trends will impact Pennsylvania, it is important to first understand the strengths, weaknesses, opportunities, and threats (SWOT) facing agriculture in Pennsylvania.

Pennsylvania's agricultural industry is rooted in a number of strengths that it can build from in responding to threats and opportunities resulting from the macro-factors (Figure ES.1). The diversity and quality of crops and producers, smaller farms, a mix of conventional and natural farming practices, rich soil, a strong farming tradition and good foundation of agricultural infrastructure will enable producers and manufacturers to respond proactively.

Figure ES.1: Pennsylvania Agriculture SWOT Analysis

ECONOMIC CLUSTER ANALYSIS

Beyond measuring the economic impact, a micro analysis was undertaken to fully explore the breadth, depth, and importance of the many subsectors that compose the Commonwealth's agriculture industry. A cluster analysis was utilized to identify which agriculture subsectors are growing and which are declining, the subsectors in which Pennsylvania has a competitive advantage, and which subsectors should be the focus of economic development efforts.

The cluster analysis evaluated each subsector's concentration in the Commonwealth, current number of jobs, and percent change in employment between 2007 and 2016. Of the 35 agriculture subsectors, five are strong and growing, indicating potential clusters: poultry and egg production; horses and other equine production; animal food manufacturing; fruit and vegetable preserving and specialty; and other food manufacturing. The concentration of firms in these subsectors, and the employment growth they are experiencing, indicate a competitive advantage for Pennsylvania that may result in their further growth.

Over half of the agriculture subsectors represent a potential opportunity for the Commonwealth. These subsectors have low concentration of firms but have experienced recent job growth. Since there are so many subsectors that would benefit from economic development efforts in this category, stakeholders will need to focus efforts in select areas. Sectors that represent the best opportunities include dairy cattle and milk production, support activities for animal production, and vegetable farming. With support, these subsectors could transition into potential clusters with a competitive advantage for the Commonwealth.

There are also a number of subsectors that, despite their high concentration within Pennsylvania, are at risk due to recent job loss. These sectors, concentrated in food processing and wood product manufacturing, likely need special attention to maintain their competitive advantage.

The cluster analysis illuminates several trends useful for developing a strategic plan for agriculture in Pennsylvania. For example, while beef processing is able to meet the demand for processing generated in some areas of the state, a significant portion of poultry raised in the Commonwealth needs to leave Pennsylvania to be processed. When coupled with the competitive advantage enjoyed by the poultry and egg production sector, this suggests that there is significant opportunity for the poultry processing sector to expand. The potential of the beverage manufacturing sector is mainly being driven by the significant recent growth in the number of micro-breweries within the state. Given the Commonwealth's favorable climate for growing hops, farmers may be able capitalize on the growth of the micro-brewing sector by diversifying into growing hops to support Pennsylvania breweries and to export to other states.

Between 1997 and 2012, employment growth in the crop and animal production sector outpaced the growth in the sector of the neighboring states as well nationally. Employment in the forestry sector has been declining in the Commonwealth, in the neighboring states, and nationally. However, the decline in the sector in Pennsylvania has not been as severe as the decline in the sector nationally and in the neighboring states. In the food processing and manufacturing sector between 1997 and 2009, employment in Pennsylvania, the neighboring states, and nationally has been declining; however, beginning in 2010, the sector started to recover. The decline in Pennsylvania was more severe and recovery slower compared to the nation and the neighboring states. Except for a slight decline due to the Great Recession, employment in the landscaping sector has been steadily increasing across each of the geographies, with the largest increase being in Pennsylvania.

Compared to overall employment growth in the Commonwealth, since 1997, growth in the crop and animal production sector has outpaced total employment growth – 11 percent compared to 22 percent for the crop and animal production sector. Employment growth in the food manufacturing and processing sector and forestry sector has lagged total employment growth in the Commonwealth.

Drivers and Trends

This report builds on the major drivers identified in the agriculture industry sessions organized by PDA, Team PA, and the Pennsylvania Agricultural Advisory Board by undertaking a scan of the macro-level factors and regional trends affecting supply and demand for agricultural products. Through our review of existing research studies, analyses, data, and market reports, we identified several key trends impacting Pennsylvania agriculture:

Major Drivers Identified in Agricultural Industry Listening Sessions:

- Business Development & Environment of the Industry
- Human Capital / Workforce / Education
- Communication
- Technology & Science
- Land & Stewardship

Changing Consumer Tastes: Changing consumer tastes, particularly the growing demand for local food and transparency in food production, create both challenges and opportunities for Pennsylvania farmers and food and beverage processors and manufacturers.

Regulation and Business Environment: The business environment and regulations must be reviewed in the context of whether they are encouraging or stemming entrepreneurship and innovation in the agricultural sector.

Innovation: Technology and science are one of the core drivers shaping the future of agriculture in Pennsylvania.

Trade Agreements and Exports: The changing political climate around trade has created uncertainty for the future of Pennsylvania's agricultural exports.

Workforce Shortage: The agricultural workforce shortage in Pennsylvania is driven by the aging of sector employees, tightening immigration laws, and a growing skills gap. It is estimated that there will be more than 75,000 new and replacement job openings in Pennsylvania agriculture over the next decade.

Automation and Efficiency: Agriculture ranks fourth in the industry for potential automation. It is estimated that 57 percent of agricultural work in the United States can be automated.

Physical Infrastructure: Aging infrastructure is a problem nationwide, and one that restricts the production and transportation of agricultural products throughout the supply chain.

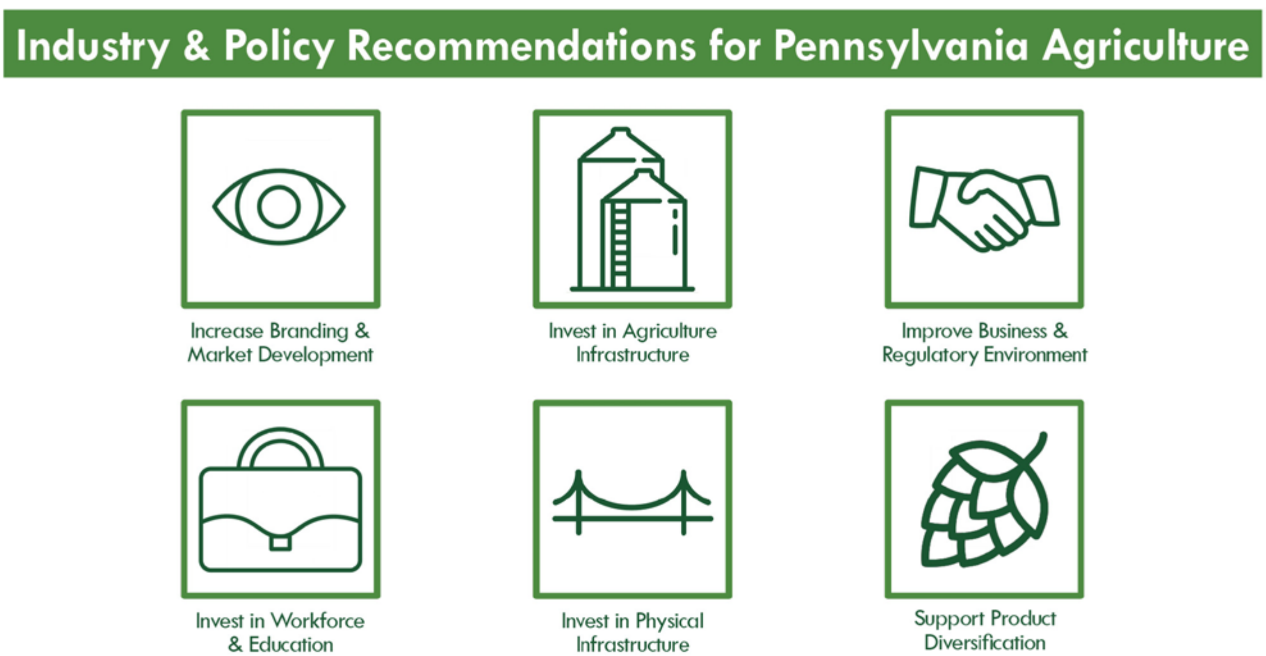
Environmental Pressures: The agricultural industry in Pennsylvania, particularly crop production, is vulnerable to environmental changes and pressures.

INDUSTRY AND POLICY RECOMMENDATIONS

The agricultural sector can best position itself to build on its strengths and capitalize on opportunities by positioning itself to address and adapt to changing consumer tastes, increased automation, workforce shortages, and uncertain trade and guest worker conditions. These recommendations are intended to guide Team PA, PDA, and the Agricultural Advisory Board in the development of a strategic plan, the next step in the proactive, collaborative work to best position the industry for the opportunities and challenges it will face over the next decade and beyond.

Areas of Recent PDA Focus

- Investment in farmland preservation and farm transitions
- Updates to PA Tax Code
- Support for workforce development and apprenticeships
- Investment in Pennsylvania's physical infrastructure
- Funding for product diversification
- Expanded branding and marketing outreach



Increase Branding and Market Development

Challenge: Low visibility of the connection between the PA Preferred™ brand and consumer demand for local, natural products and transparent supply chains.

Goal: Develop the PA Preferred™ program as synonymous with local, healthy, and traceable, and expand producer enrollment in the program, targeting sectors that are well positioned to capitalize on changing consumer trends.

Strategies:
- Focus on branding PA Preferred™ as local and traceable
- Increase outreach for enrollment in the PA Preferred™ Program
- Strategically market sectors that are well positioned to capitalize on demand for natural products
- Boost domestic markets and value-added manufacturing opportunities for Pennsylvania hardwoods
- Expand farm to school programs to build awareness of agriculture and agricultural products in Pennsylvania

Invest in Agricultural Infrastructure

Challenge: Gaps in production, processing, and manufacturing of agricultural products limits the productivity and growth of Pennsylvania agriculture.

Goal: Reduce supply/demand gaps throughout the supply chain by strategically increasing processing and manufacturing capacity, while continuing to preserve agricultural land through the Farmland Preservation Program.

Strategies:
- Maintain the strength of Pennsylvania's nation-leading Farmland Preservation Program
- Improve volume, quality and price realization to address existing gaps in the processing and manufacturing infrastructure
- Invest in sectors with projected growth to minimize future processing bottlenecks
- Support processing automation to increase productivity and efficiency
- Increase byproduct processing capacity to reduce food waste and increase product diversification

Improve Business and Regulatory Environment

Challenge: Constraints to productivity, efficiency, and development of agriculture in Pennsylvania due to the regulatory and business environment, which limit investments in production, processing, and manufacturing in the state.

Goal: Develop streamlined state permitting and regulatory processes for the agricultural industry and reconsider policies that deter agricultural investments in Pennsylvania.

Strategies:

- Establish an industry-government working group to review regulatory and business statutes impacting the agriculture industry, and provide recommendations to improve existing policies
- Establish a point of contact within PDA to help producers and processors navigate state and federal regulations

Invest in Workforce and Education

Challenge: A workforce shortage due to the aging of agricultural workers, changing guest worker regulations, and a shift in the skills needed to support an increasingly automated industry may hinder the productivity and long-term growth of Pennsylvania agriculture.

Goals: Reduce the current and projected workforce shortages through education and training that will meet the changing needs of the agriculture industry in Pennsylvania.

Strategies:

- Support apprenticeship and work-based learning programs to close the skills gap for an increasingly technology-driven sector
- Explore the potential of an ex-offender to work program to help alleviate workforce shortage issues
- Support loan forgiveness programs for large animal veterinarians and other high-shortage careers
- Increase agricultural education in STEM-related courses to prepare the state's workforce for increased automation
- Diversify business of farming education to address changing consumer tastes and evolving business models

Invest in Physical Infrastructure

Challenge: The agricultural industry needs greater investments in the physical infrastructure that facilitates movement of products throughout supply chains.

Goal: Invest in Pennsylvania's transportation, broadband, and distribution systems' infrastructure to ensure that the state's producers and processors can meet consumer demands through wholesale, retail, and direct-to-consumer channels.

Strategies:

- Invest in transportation infrastructure to strengthen movements in supply chains
- Support programs to ensure the expansion and adoption of broadband internet in rural areas
- Work with producers and processors to ensure they have the infrastructure needed to access alternative distribution systems

Support Product Diversification

Challenge: The degree that Pennsylvania agriculture is concentrated in a small number of products leaves the industry vulnerable to the effects of changing consumer demands.

Goal: Intra- and inter-farm, processor, and manufacturer diversification that strengthens the resiliency of Pennsylvania agriculture against market changes.

Strategy:

- Encourage and support producers, processers, and manufacturers in product diversification
- Fund research and development to support product diversification

While the Pennsylvania food and agriculture sector benefits from its strong roots and culture of innovation, it needs a strategic plan to remain competitive in the current domestic and global environment. States with strong food and agriculture sectors stand to benefit significantly if they can more readily adapt to and capitalize on this new era in agriculture. This will require a shared vision and roadmap. This report contributes to PDA and Team PA's ongoing work to develop a shared vision and roadmap for Pennsylvania's agricultural industry.