

A CALL TO ACTION



# Ohio Smart Agriculture: Solutions from the Land

A Call to Action for Ohio's Food System  
and Agricultural Economy



Ohio  
Smart  
Agriculture  
SOLUTIONS FROM THE LAND



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Our recent initiative, *Ohio Smart Agriculture: Solutions from the Land*, was organized to identify and begin implementing pragmatic, proven, and innovative solutions to challenges confronting Ohio farmers in the face of environmental uncertainty and in support of a food system that benefits producers, the public, and the planet.

Driven by farmers — with participation from experts in agribusiness, health, nutrition policy, ecology, and conservation — the initiative explored ways to place farming at the forefront of resolving the extensive challenges facing Ohio today: hunger, poor health, degraded environments, broken economies, trade, tariffs, and limited inclusion in global economies. In doing so they considered food, agriculture, the environment, and rural and urban communities as a *system* rather than separate challenges. This effort is about creating new options and opportunities for farmers, agriculture, and consumers that together benefit all.

Through months of brainstorming, research, and dialogue with communities of interest across the state, the project leaders forged consensus on strategies to:

- **Reduce hunger and improve nutrition** by supporting the production of fruits, vegetables, animal proteins, and food-grade grains for human consumption.
- **Create jobs and generate economic growth** by diversifying and sustainably intensifying production and processing of food, feed, fiber, and renewable energy.
- **Augment ecosystems services to improve the environment, enhance the resilience** of agricultural and forested landscapes and **improve the farmer's bottom line**.

This call to action outlines their collective findings and recommendations and offers a series of priority actions needed to help Ohio's farmers and woodland managers further improve the state's quality of life through solutions they can sustainably deliver from the land.

At a time of historically high yields but low commodity prices, climate and environmental threats, and widespread hunger in a skilled and prosperous state, Ohio agriculture can diversify its production with a resilient agricultural model focused on ecosystems services.

We will succeed when the direction we set forth engages the broader community in a joint response to these issues and promotes collaboration among Ohioans. We invite you to join us in bringing this vision to life through *Ohio Smart Agriculture: Solutions from the Land*.

**Fred Yoder, Co-Chair**  
4<sup>th</sup> Generation Farmer  
Plain City, Ohio

**Lisa Hamler-Fugitt, Co-Chair**  
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**Ohio  
Smart  
Agriculture**  
SOLUTIONS FROM THE LAND

The project is funded by a generous grant from the W.K. Kellogg Foundation. WKKF, founded in 1930 as an independent, private foundation by breakfast cereal pioneer, Will Keith Kellogg, is among the largest philanthropic foundations in the United States. Guided by the belief that all children should have an equal opportunity to thrive, WKKF works with communities to create conditions for vulnerable children so they can realize their full potential in school, work, and life.



**W.K.  
KELLOGG  
FOUNDATION**



## EXECUTIVE SUMMARY



**PROBLEM:** Increasingly complex markets, low commodity prices, and more volatile weather exacerbate crop losses and degrade environmental conditions, such as the creation of the harmful algal blooms, that have combined in ways that threaten Ohio agriculture. At the same time, household food insecurity in Ohio, a state that should be a land of plenty, ranks well above the national average (15.1 percent of the population of Ohio, including one out of five children, suffer from food insecurity). Clearly, the commodities we are so good at producing are not relieving that insecurity, nor are they keeping all farms and farmers on the land. The American Farmland Trust estimates that Ohio has been losing more than 50 acres of farmland per day as the long-term trend toward fewer farmers and fewer farms continues.

**VISION:** Facing the specter of a rapidly changing and more unpredictable global environment, Ohio agriculture will adjust to these conditions and maintain a style of farming and a food system that benefits producers, consumers, the public, and the planet. Our vision is to boost profitability for farmers at all scales and in all settings, rural and urban, while improving environmental resilience, building strong communities, engaging consumers, and ensuring public health and access to nutritious food. 



**F**or more than 200 years, agriculture in Ohio has nourished us at the national and local levels. It has been a powerhouse economically and culturally, and a consistent national leader in providing a wide range of products. Its farmers have changed with the times — steadily boosting their yields, embracing technology, adopting new practices, and deepening a connection with the land and soils.

Yet the changing times have also revealed a disconnect between farms and cities. Many rural farm towns have fallen on hard times. But the highest percentages of food-insecure households fall at both the most urban and rural ends of the spectrum. Changing weather patterns have made prices — and yields— more volatile. And, despite improvements in how farmers apply nutrients, agricultural runoff still is a problem in Ohio's waterways. These are the loose threads in Ohio agriculture today.

*Ohio Smart Agriculture: Solutions from the Land* has studied this landscape for nearly two years and now unveils a comprehensive strategy to re-weave these threads into a beautiful, strong, and valuable tapestry that reconnects Ohioans, helps reduce hunger, and strengthens communities — all in a way that draws from and gives back to our ecosystems.

The Ohio Smart Agriculture Steering Committee developed this vision for mid-century agriculture after intensive research, presentations, and discussion of the challenges and opportunities that Ohio



agriculture faces. Four workgroups delved into climate, ecosystems, market opportunities, and hunger, and identified three pathways for achieving these solutions from the land:

- **Reduce hunger and improve nutrition by supporting the production of fruits, vegetables, animal proteins, and food-grade grains for human consumption.**
- **Create jobs and generate economic growth by diversifying and sustainably intensifying production and processing of food, feed, fiber, and renewable energy.**
- **Augment ecosystems services to improve the environment, enhance the resilience of agricultural and forested landscapes and improve the farmer's bottom line.**

The result is a set of 50 goals and recommendations apportioned among these pathways to guide the next generation of Ohio agriculture. The steering committee then identi-

fied four major initiatives that could be launched in the very near future and, together, set the stage for all the recommendations. Each of the four initiatives encompasses several of the goals and recommendations.

This taxonomy of pathways, goals, and initiatives should not in any way be considered a form of prioritization. This call to action emphasizes that Ohio Smart Agriculture is a **long-term**, comprehensive initiative that requires sowing seeds along all three pathways at once: Agriculture is a *system*, and *all the recommendations together* are priorities that will enable the transformation we envision.

The four sweeping initiatives are the kinds of **short-term** actions that can attract financing for this effort and enlist others to join the quest for a wider range of goods and services from Ohio's farms and woodlands. **The order in which they are presented here does not connote any ranking. These steps are interconnected and interdependent “launching pads.”**



**Initiative I: Make Ohio agriculture and the food system a public policy priority.**

- A) Form and properly resource a Farm, Food, and Health Partners Alliance (a non-governmental group of stakeholders from across the spectrum of food and agriculture).
- B) Create an interagency task force to align state agencies toward effective and coordinated food, health, and agricultural programs.
- C) Restore state government as a marketer and champion, as well as a regulator, of agricultural goods and services (through such programs as Ohio Proud).

**Initiative II: Diversify and sustainably intensify the production of food, feed, fiber, and fuel.**

- A) Integrate commodity with diversified, identity-preserved, value added agricultural production to enhance ecosystem services and public support for Ohio agriculture.
- B) Promote workforce development and resources, such as land access, to ensure a strong agricultural economy.
- C) Create a strategy to strengthen value-added woodland supply chains and create new markets for residual forestry products.

**Initiative III: Use institutional buying power to ramp up demand for "Ohio Smart Food."**

- A) Jump-start infrastructure development by quantifying

demand for and encouraging commitment to local food purchasing by public institutions.

- B) Develop an independent "food system finance authority" to pay for development of processing infrastructure.
- C) Develop and pilot a small-scale, mobile meat-processing unit.
- D) Regularly evaluate the food needs and preferences of Ohioans through surveys.

**Initiative IV: Implement landscape-scale, climate-smart agriculture strategies to ensure sustainability and abate agricultural runoff.**

- A) The state of Ohio and all stakeholders should, by 2020, formulate and oversee the implementation of a new state water quality strategy that includes current public and private sector response initiatives.
- B) Develop and implement a climate-smart action plan for Ohio agriculture to help farmers adapt, improve resilience, and deliver products and services that mitigate climate-change impacts.
- C) Track and publish statewide progress data to assure and celebrate continuous improvement.

Among the remaining recommendations are recurring themes that illustrate the interconnectedness of these strategies:

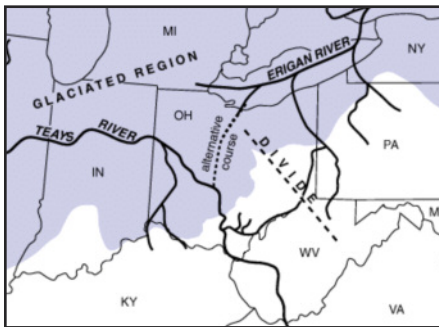
- Local and regional supply chains offer great potential for growth

once the processing and marketing infrastructure are in place; they can reduce food insecurity while creating jobs and strengthening local economies.

- A greater variety of grains and grasses can improve soil health and reduce runoff from fields; developing markets for winter cover crops can make them and the ecosystem services they provide more attractive to farmers.

The goals and recommendations in this call to action are the result of collaboration among many interests: commodity growers, produce farmers, foresters, public health and nutrition experts, agribusiness leaders, academics, environmentalists, agriculture advocates, and others. A coalition this diverse, coming to consensus on a 30-year vision, shows the seriousness of this call to action and provides a strong foundation for a widespread movement to prepare Ohio agriculture for a challenging future.

The current coalition, however, is only a start. We need agriculture industry leaders, political voices, community and consumer support, and institutional backing if we are going to ensure that political, economic, and social frameworks are ready for these changes. We encourage you to study the vision we've described, share it with those who would appreciate its message, support and join us as we move forward with *Ohio Smart Agriculture: Solutions from the Land.* 



**T**he story of Ohio agriculture is as old as the hills. The richness of many Ohio soil types is a product of glaciers that reshaped the landscape and left deposits when they receded. The resulting woodlands, wetlands, and prairies were cleared, drained, and plowed to make way for subsistence agriculture for early settlers, and later — as towns grew and industry emerged — to feed the population in the burgeoning towns and regions.

Two hundred years of agricultural change and industrial growth, however, have further remade Ohio’s landscape and climate. Farmers and

others are now trying to figure out what Ohio agriculture will look like in 2050: How will we adapt to changing weather patterns? How do we make sure that the products of our land will nourish even the most vulnerable among us? What practices will nourish the soil and water? How will we cultivate an agricultural economy that ensures strong Ohio communities?

*Ohio Smart Agriculture: Solutions from the Land* started planning for this future by looking to the past.

Even two centuries ago, early Ohio farmers balanced the locally oriented frontier economy by producing commodities for sale in distant markets. Corn was easier to transport if it was distilled to make whiskey — a product that, as one Ohio historian has written, was “both potable and portable” for the journey east across the mountains or south down the Ohio and Mississippi rivers. By 1850, Ohio


*Farmers and others are now trying to figure out what Ohio agriculture will look like in 2050.*



tomatoes, peppers, cucumbers, and other produce grown for large national processing facilities in the state. Ohio became more specialized — and was very good at what it did. It has long been among the leading national producers of corn, soybeans, pork, dairy, and many other goods.

Today, Ohio is an agriculture powerhouse. Food and agriculture make up Ohio’s largest industry, contributing more than \$124 billion in annual economic impact and employing 1 in 8 people.<sup>i</sup> That total includes much of the \$26 billion the forest sector generates. Ohio has some of the most fertile land in the country with 14 million acres in production; 75,000 farm operations; and more than 1,200 food processors.<sup>ii</sup> In 2017 Ohio ranked third in egg production nationally; eighth in hogs; fifth in floriculture; sixth in wine production; first in home furniture production; seventh in soybeans; and eighth in corn. Much of the corn and soybeans are used as feed for the state’s high-value livestock and poultry industries.

Despite Ohioans’ skill and success in production, the new model runs counter to the historical balance between local markets and commodity markets. This has contributed to a disconnect between farmers and consumers — to the point that today many young Ohioans identify food as coming from the grocery store rather than the land.

Against this rich history and current conditions, several big challenges cloud the future of Ohio — setting the stage for a lot of new opportunities. 

was the nation’s leading corn producer and second in wheat. Livestock, too, had both local and commodity markets, though many of the hogs raised in Ohio went to processing plants that turned Cincinnati into a “Porkopolis” that fed much of the country.

Through the 20<sup>th</sup> century, building on advancements from “agricultural and mechanical” land-grant colleges like The Ohio State University (OSU), Ohio agriculture became steadily more commodity-oriented. Again, for much of the century, it was balanced with the production of local foods. Even small cities had public markets, dairies, slaughterhouses, and truck farms to feed local populations. Many also had large greenhouses as Ohio became a hotbed of hothouse tomatoes. As recently as 1970, the City of Cleveland had 400 acres under glass, providing produce for a large swath of the region. Greenhouses

**In 2017 Ohio was:**

- 8<sup>th</sup> in corn production**
- 7<sup>th</sup> in soybean production**
- 4<sup>th</sup> in tomato production**
- 3<sup>rd</sup> in egg production**
- 8<sup>th</sup> in hogs and pigs**
- 7<sup>th</sup> in number of farms nationally.**

in surrounding towns and counties added to that total.

In recent decades, in a significant departure from farm economies of the past, agriculture in Ohio and around the country evolved into an efficient specialization of production in different regions: produce in Florida and California for year-round growing, for example, and commodity grains in the Midwest and Plains states. In Ohio, the changes led to a decline in the

SOURCE: MASS, OHIO AGRICULTURAL STATISTICS ANNUAL BULLETIN 2017-2018 (MASS, USDA.GOV)





In 1987, Ohio and the nation were still in a farm financial crisis that accelerated the trend toward fewer farmers and bigger farms. Tractors and combines did not have GPS technology. There were no GMO seeds. No-till practices were still just taking root. Lake Erie was getting healthier. Average corn yields in Ohio had reached new highs of over 120 bushels per acre. Soybeans averaged 37 bushels and wheat 58. The average age of an Ohio farmer was 51. Even accounting for inflation, the cost of a combine in 1987 was about half of what today's farmers pay for more comfortable combines with bigger headers and bins. This same axiom holds true for today's loggers trying to purchase new log skidders or timber harvesters.

A lot has changed in the 30 or so years since then. A lot more will change in the next 30 years, as technology increases the pace of innovation and ecological and economic factors drive even more change. Have the changes been good for the Ohio agricultural industry? For Ohio agricultural output? Have the changes been good for Ohio farmers or Ohio consumers?

What can we expect by the year 2050? Will weather patterns continue to shift? Will we see heavier and more sporadic rains? Hotter and drier weather? Will annual algal blooms in the Western Lake Erie Basin appear sooner and grow larger? Will we see 300-bushel corn? Will the average age of an Ohio farmer — 56.8 years in 2012 — continue to rise? Or will a new generation of farmers start to

### In 1987:

**Corn yield:**  
120 bushels per acre

**Soybeans yield:**  
37 bushels per acre

**Wheat yield:**  
58 bushels per acre

**Average age of  
Ohio Farmer in 1987:**  
51.1 years

### In 2017:

**Corn yield:**  
177 bushels per acre

**Soybeans yield:**  
49.5 bushels per acre

**Wheat yield:**  
74 bushels per acre

**Average age of  
Ohio Farmer in 2012:**  
56.8 years.

SOURCE: NASS, UNITED STATES CENSUS OF AGRICULTURE 1987 AND 2012 (NASS.USDA.GOV/AGCENSUS); NASS, QUICK STATS 2017 (QUICKSTATS.NASS.USDA.GOV)

reverse that trend? How will those farmers differ from today's typical farmer? What challenges and opportunities will they face?

Those are some of the conditions and questions we began to examine in March 2017, when *Ohio Smart Agriculture: Solutions from the Land* convened a steering committee from all facets of agriculture and the food system across the state. The team's mission was two-fold: to identify challenges confronting Ohio farmers in the face of environmental uncertainty and market volatility and to implement solutions that are pragmatic, proven, and innovative — and supportive of a food system that benefits producers, the public, and the planet.

Since then, the committee, along with four workgroups and external collaborators, has held numerous meetings (including regional sessions in Piketon, Springfield, Bowling Green, Wooster, and Reynoldsburg). They have studied reports and heard presentations

*Will weather patterns continue to shift? Will we see heavier and more sporadic rains? Hotter and drier weather?*



In Ohio, 1,758,310 people are struggling with hunger - and of them, 528,960 are children.



People facing hunger in Ohio are estimated to report needing

**\$829,430,000**

The average cost of a meal in Ohio is \$2.76. Data from Feeding America's [Map the Meal Gap 2016](#) study.

*Reconnecting Ohioans with food, and with agriculture, is a matter of survival.*

from experts in nutrition and health policy, climate science, soil science, meat processing, agricultural economic development, forestry, finance, and other topics.

This work uncovered three recurring themes: 1) hunger and food insecurity; 2) climate and water quality; and 3) profitable farms and communities.

**1. Hunger and food insecurity**

Today, 15.1 percent of Ohio's population is "food insecure," meaning they may need to make trade-offs between basic needs, such as housing or medical bills, and purchasing nutritionally adequate foods. Among Ohio's 2.6 million children under age 18, one out of five is food insecure. In fact, even in wealthy suburban counties, 15 percent of children are food insecure — leaving Ohio with the nation's 15<sup>th</sup> highest rate of child food insecurity.<sup>iii</sup>

Ohio is in the bottom quintile of states in several other health and nutrition metrics as well. It is

ranked 42<sup>nd</sup> among the 50 states for preventable hospitalizations, 41<sup>st</sup> for cancer deaths and infant mortality, and 40<sup>th</sup> for obesity. Ohio's infant mortality rate of 7.4 out of every 1,000 births in 2016 was well above the national average of 5.9 per 1,000 births. Eleven percent of Ohio children have asthma (8 percent nationally), and 33 percent are overweight/obese (31 percent nationally)<sup>iv</sup>. Many Ohio farmers are surprised and alarmed by this, and they want to develop ways to ensure Ohio agriculture sustains Ohio's people and land.

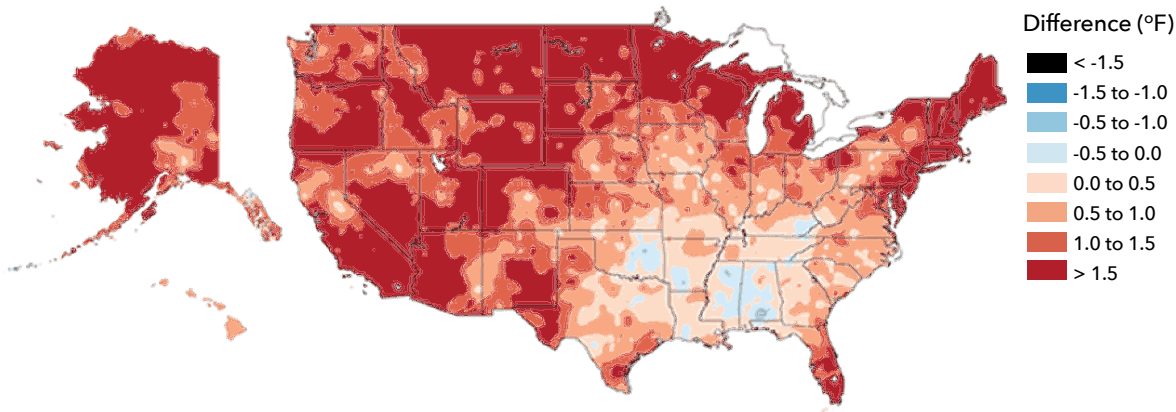
**2. Climate and water quality**

The incidence of heavy rains — a half-inch, one inch, or two inches in a day — has risen steadily across Ohio since 1950. Most regions now see at least five or more such rains per year than in 1950, and some as many as 10<sup>v</sup>. Unusually wet springs sometimes force farmers into the costly position of replanting crops. They also face longer droughts that reduce yields. These changing weather patterns have exacerbated water quality challenges.

SOURCE: MAP THE MEAL GAP STUDY AT [HTTPS://WWW.FEEDINGAMERICA.ORG/HUNGER-IN-AMERICA/OHIO](https://www.feedingamerica.org/hunger-in-america/ohio)



Annual average temperature change over the contiguous United States for the period 1986–2016 relative to 1901–1960



SOURCE: NATIONAL CLIMATE ASSESSMENT, CLIMATE SCIENCE SPECIAL REPORT 2017 (SCIENCE2017.GLOBALCHANGE.GOV), WITH CREDIT TO AARON WILSON (OSU)

LOWER CHART SOURCE: CIC-SNC AND NOAA, OHIO STATE CLIMATE SUMMARY 2017 (STATESUMMARIES.NCICS.ORG/OH), WITH CREDIT TO AARON WILSON (OSU)

Across Ohio, farmers are dramatically expanding their efforts to reduce nutrient runoff into lakes and streams around the state. As documented in A Report from Ohio’s Farm Community, the agriculture sector has been working for years to reduce nutrient loads in the Western Lake Erie Basin, yet more help and work in this area is needed.

### 3. Profitable farms and communities


A new way of looking at agriculture would help farms become profitable while also addressing climate, hunger, and health-related social issues. Greater diversity in production would give farmers more options and opportunities to withstand market volatility. The variety would make Ohio-grown food more accessible to hungry Ohioans, while also enriching the soil in ways that reduce nutrient runoff and absorb carbon dioxide from the atmosphere, and that compensate farmers for those ecosystem services.

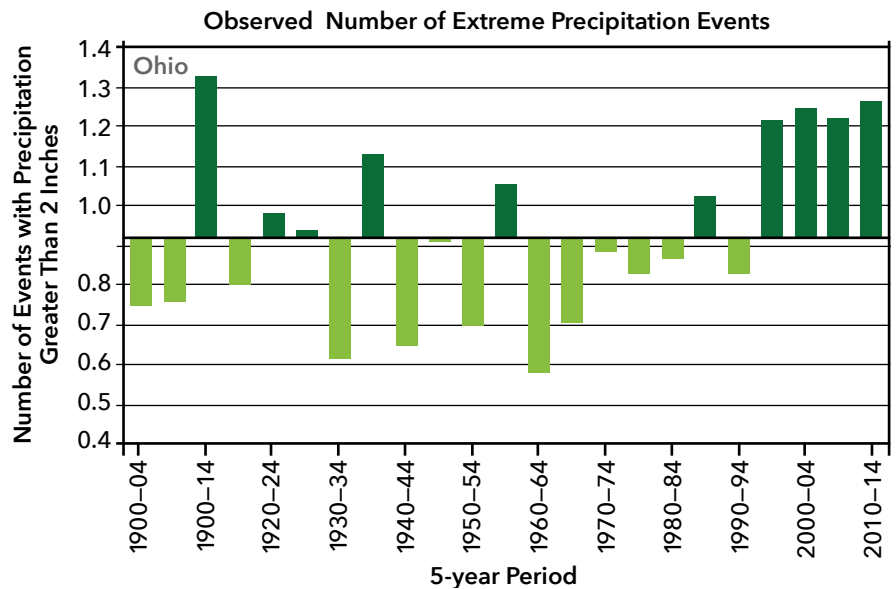
Reconnecting Ohioans with locally grown food, and with agriculture

in general, is a matter of survival. The future of agriculture is critical for all of us, and we cannot take it for granted. We need action now to begin ensuring that Ohioans are sustaining Ohio and choosing stewardship practices that will sustain the people as well as the land.

By increasing options and opportunities for farmers — and by boosting the production, processing, and distribution of Ohio-grown food for Ohio consumption — more of Ohioans’ food dollars will remain in their communities and, by the multiplier effect, strengthen local

economies in ways that help reduce food insecurity.

As we began to organize the challenges and opportunities we identified for this call to action and to develop long-term, comprehensive recommendations and shorter-term actions and strategies, we got a concise summary of our mission. Casey Hoy, faculty director of the OSU Initiative for Food and AgriCultural Transformation (InFACT), said, “Our task is not a specific vision, but preparation for change.” 





# CHALLENGES AND OPPORTUNITIES



*“The foods most in need in Ohio are not the foods most widely produced in Ohio.”*

## Hunger, Health, and Food

### FOOD INSECURITY AND INADEQUATE SUPPLY

**CHALLENGE:** Despite Ohio's rich and diverse farm heritage, a disconnect has emerged between the people of the state and Ohio agriculture — to the point that many know little about farming, and one out of five children don't know where their next meal is coming from on any given day due to a lack of income, education, and access to available resources, such as access to federally funded nutrition assistance programs. These eye-opening facts provoked extensive discussion and brought farmers together with food and

nutrition leaders, health advocates, and others to work toward common goals. As Jim Patterson, a longtime orchard operator and a member of the OSA Steering Committee, put it, “The foods most in need in Ohio are not the foods most widely produced in Ohio.”

**OPPORTUNITY:** Ohio is blessed with ample sources of water and rich soils suitable for great diversity of food production. The state has fed itself in the past and has the resources to do so in the future. By re-establishing the infrastructure and supply chains for meat, poultry, fruits, and vegetables, Ohio can create more food-industry jobs, have convenient marketing channels for farmers, and make fresh food readily accessible to Ohioans of all



income levels. Consumers want more food that is produced in Ohio. To meet the demand, the state can develop more slaughterhouses, cold storage, and aggregation points, as well as facilities for cleaning and slicing produce, flash freezing, and high-pressure pasteurization. The supply chain must ensure market access to all farmers and food access to all Ohioans.

## CONNECTING WITH CONSUMERS

**CHALLENGE:** Ohio farmers and farm organizations frequently lament consumers' lack of agricultural understanding, with tales of children who think food comes from grocery stores rather than farms. But at the same time, much of modern agriculture has become less visible, with most livestock raised indoors. The farmer-consumer disconnect is underscored by the number of food-insecure households in Ohio.

"I deliver exactly what my customer wants. But my customer is ADM and Cargill," said steering committee member Mark Drewes, a prominent Northwest Ohio grain producer. He added that farmers need to better understand the destination and end users for what they grow.

These concerns aren't new. Researcher Ken Meter, in his 2011 report, *Ohio's Food Systems – Farms at The Heart of It All*, noted:

Over the past 40 years, Ohio, as a farm state, has been caught in a conundrum. Population has increased, personal income has risen rather sharply, and food consumption has increased. Yet farmers' income has steadily



eroded. Not only are farmers and consumers disconnected from each other in economic outcomes, they have also become more and more disconnected physically as well. Until this disconnect is healed, it will be very difficult for Ohio to find balance in its food economy. In a rapidly changing system such as the food system, continual communication between farmers, consumers, and other stakeholders is essential, if the state is to adapt to changing conditions.<sup>vi</sup>

Food deserts are high-poverty urban or rural areas ill-served by grocery stores. The rural food version is compounded by great distances and fewer transportation options — and the sad irony of having to drive for miles past corn and soybean fields only to find an inadequate selection of fresh food at convenience stores. Vinton County and its 13,000 residents, for example, were without a single

*"I deliver exactly what my customer wants. But my customer is ADM and Cargill."*



scale. Such specialization contributed to loss of balance between commodity production and feeding local populations in an economy that tied farms more closely to the cities.

**OPPORTUNITY:** Many steering committee members look to younger farmers — such as newcomers capitalizing on the growing demand for local, organic, or civic agriculture (food produced by someone you know personally). This includes urban farmers trying to bring fresh food and a sense of community to challenged neighborhoods and “new Americans” — immigrants and refugees who want to retain their traditional diets and allow community elders to pass on their agricultural knowledge to youth.

Agricultural diversity also refers to the range of goods produced on a given farm and to adding value through processing and marketing, whether on-farm or in town. It also can mean “agritourism,” pick-your-own sweet corn or berries, and Christmas-tree farms. For many grain producers, diversity could mean growing specialty grains for niche markets or developing markets for small grains or other crops that can be used for winter cover or to expand the rotation. It could mean non-GMO crops or grains for brewers and distillers, biofuels or other industrial needs.

One of many important reasons for developing a local food system is strengthening the local economy by keeping food dollars circulating locally. If farmers can have a stake in the value chain (through co-ops,

grocery store for several years until 2017. Farmers are doing what their markets ask of them, but there is a disconnect in the food system.

Today’s consumers, as well as young students, are also disconnected from the source of their forest products. Many will write an essay bemoaning timber harvesting while using a pencil and notepad made from wood fiber, while sitting at their wooden dining room table. Or they may think that timber harvesting kills and displaces all wildlife, while a wildlife manager espouses the benefits of timber harvesting as the best method for enhancing wildlife diversity and populations.

**OPPORTUNITY:** The growing interest in local food has tended to focus on high-end and niche markets, though the food banks supplied by the Ohio Agricultural Clearance Program are an important example of farmer-led contributions to address hunger in our communities. Both approaches provide a model for reconnecting Ohioans with the agricultural bounty that surrounds them. The unmet demand for Ohio-raised

meat, produce, and other food offers a great opportunity for expansion of existing local-food producers and an opportunity for all farmers to differentiate and/or diversify on some of their land. With the right marketing and policies, the demand can grow for years to come — and consumers will better understand how the food that nourishes them is raised and grown.

## Agriculture and Economic Growth

### AGRICULTURE DIVERSITY

**CHALLENGE:** Two generations ago, diversified family farms were still common in Ohio. The primary cash crop may have been corn, wheat, or soybeans, but many farms also produced some combination of poultry, dairy, beef, pork, produce, hay, and small grains. As markets consolidated, many livestock producers got out of the business, and the fields where they produced hay and silage were instead planted in grain. Those who remained in livestock often ended up specializing in one commodity at a larger



for example), it can add stability. Local processors and distributors can expand as more local food becomes available and the demand grows. They can forge partnerships—collaborating with producer co-ops to ensure steady supplies. OSU studies of businesses in the local-food value chain have shown that their success is often linked to their business-relationship models.

## FARMS AND FARMERS

**CHALLENGE:** Ohio currently has about 13.96 million acres of working farm land — down from 15 million in the mid-1980s and 20 million in 1954. Some of the loss was from urban development. Even urban agriculture, touted for its growth in recent years, has far less acreage than 50 years ago. Competition is stiff for remaining farmland, and land values, startup costs, and high capital investment costs make it difficult for new, young farmers to gain a foothold. The coming generations of farmers will need to find profitable niches and products. That does not mean abandoning the leading commodities produced today — Americans will continue eating beef, pork, and chicken; markets for corn and soybeans will not go away. It does mean, however, that farmers will seek new sustainable strategies and, most likely, diversity of production to ensure whole-farm profitability.

**OPPORTUNITY:** Ohio already has a valuable asset on which to expand: It is among the country's top 10 producers of corn, soybeans, dairy, eggs, pork, processing tomatoes, apples, wine grapes, and other value-added products like Swiss

## Former dairy farmers find a new way

**W**hat do you do when forces beyond your control put an end to the vision you had for your farm? Is there a Plan B? Danielle and Andy Burch found out the hard way how important it is to have diversity, new markets and options in agriculture.

The couple married in 2009 – a bad year for dairying – but weathered the tough time and even increased their herd in 2014. Andy had been running the farm near Salem in eastern Ohio largely on his own since



*The Burch Family*

he was 17. He started with 20 cows and was up to 120 when they had to sell the herd in 2017.

“It didn’t make sense any more – financially, nothing panned out,” Danielle said. “Any proper businessperson would tell you there’s no reason to continue on when the books are in the red so consistently you cannot dig out.”


The Burches suffered the one-two punch of high feed costs and low milk prices in 2015 and 2016. Danielle calls it a “perfect whirlwind of problems” and said a lot

of other dairies failed in Columbiana and nearby counties.

“After a pretty significant mourning period that we both had to go through after the cows were gone, our small farm has re-identified,” she said. The couple began “finding a new way,” initially with about 90 replacement heifers from their breeding stock.

In addition, Danielle and her father have a diverse Angus herd and are working on breeding – including an Angus-Holstein cross as more dairies close and their market for heifers declines. They also produce pork on pasture – expanding from two pigs in pasture to three pregnant sows. Though right now they mostly sell freezer meat directly to customers, they are considering a CSA model to distribute a mix of cuts to a larger pool of buyers.

“Things are smoother now that I’ve learned how to rely on others,” Danielle said, crediting a good business relationship with Horst Packing – known locally as the Columbiana Candy Store. Still, she said, it’s not easy or cheap for a farm to develop a whole new business model. She’d like to see programs to assist farms in transition.

“We’re in it because it’s a passion. But sometimes, we just need help.” 



cheese and maple syrup. Strengthening domestic markets and seeking new export markets for corn, soybeans, dairy, beef, pork, and other commodities remain important priorities. At the same time, there is steadily increasing production of local food for local markets. For example, organic product sales are increasing much faster than overall food product sales (6.4 percent versus 1.1 percent in 2017 according to the Organic Trade Association).

The future offers a chance to ease tension among, and intertwine, all forms of agriculture no matter what label it carries. More and more, Ohio's commodity growers are looking to diversify. Some have set aside acres for the cut-flower market to generate a steady stream of income amid fluctuating commodity prices. Others have embraced on-farm processing to create new markets for small grains, as with malt houses for the brewing and distilling industries (Ohio already has a healthy wine industry). For years, many have grown fields of sweet corn to supplement their

income or create a college fund for their kids.

Farmers know that the best way to preserve farmland is to make farming profitable. Opportunities for farmers can grow if their work has a higher profile and greater connection with the community. The Black Swamp Conservancy, Ohio Ecological Food and Farm Association, and Ohio Farm Bureau Federation are among the entities trying to mentor young farmers and link them with land and opportunities. Establishing a mixed portfolio of crops and spreading risk among markets can help maintain their stability. Some in Northwest Ohio — perhaps because they see the large Canadian-owned greenhouses built in recent years — are returning to the green beans, tomatoes, and other produce that used to be more common in the region.

### AGRICULTURE INFRASTRUCTURE AND JOBS

**CHALLENGE:** The 2011 *Farms at The Heart of It All* report showed

that the 40-year period when Ohio farms grew larger and less diverse coincided with the decline of rural communities. Farmers doubled productivity in that time, which suggests that the extra effort they took to assume more debt, work more efficiently, and produce more did not bring them or their communities financial rewards. Rather, that extra value created by farmers was realized by others in the food system.

Many markets have shifted away from small Ohio towns. The local elevator, long a foundation of the small-town rural economy — for sales, marketing, feed, seed, etc. — is empty in many places, replaced by larger, more-distant facilities or by on-farm grain storage. In the same way, meat processing has shifted from local to regional or national facilities. Ohio still has more slaughter facilities than many other states, due to its long history of a state inspection program. Most remaining plants are small and focused on custom slaughter, and only one is certified as an organic meat processor to serve the burgeoning organic market. Pork and beef producers typically need to schedule slaughter with their butchers months in advance. Often, the bottleneck is in cold storage, not on the kill floor.

Similarly, the raw timber value in high-poverty Appalachian Ohio has a very low value-added segment, while Northwest Ohio has little raw-timber value but a high value-added economy for forest products. In both regions, the timber workforce is aging and is not being replaced. The capital cost of timber





operations has risen steadily, making it a difficult field for young foresters.

**OPPORTUNITY:** If Ohio’s focus is on keeping food dollars in the region — emphasizing Ohio’s food industry as an economic engine — people might make different decisions on job training, hiring, investment, and even deciding which crops to grow and livestock to raise. New slaughter plants in Michigan, North Carolina, and Virginia in recent years have led to increased local production of beef and pork.

Dairy farmer Eric Grimm in Lorain County worries that if consumers focus only on the lowest retail price of a gallon of milk, smaller local dairies could be squeezed — and consumers will lament the disappearance of the Holsteins and Jerseys that gave them comfort and a sense of place on drives in the country. But if consumers see how the price of milk is related to the landscape and the economic health of the county, they might make different decisions. Grimm has worked with instructors in Lorain County Community College’s sustainable agriculture program. With the local Farm Bureau, they organized community events such as a showing of “Forgotten Farms,” a 2017 documentary film about the struggles of New England dairy farmers and efforts to bring together different agricultural factions, such as older conventional farmers and young organic produce growers.

Such initiatives are one strategy to reconnect farms and cities, and rural and urban economies. Others

include increasing the sale of locally raised fruit, vegetables, meat, and dairy products to local schools, colleges, and hospitals; keeping our food dollars in Ohio with more value-added processing facilities in the state; understanding and promoting the ecosystem services that farmers can provide by sequestering carbon in the soil and reducing nutrient runoff into rivers and water supplies; and making environment, agriculture, food, and nutrition a more fundamental part of our educational system.

The Ohio Department of Natural Resources (ODNR) Division of Forestry and OSU Extension have designed the Ohio Woodlands Job Corps to provide temporary employment, job training, and skills that employees can use in forest management careers. It was supported by federal recession recovery funds in 2012 but is currently unfunded. There are opportunities for forestry education and training to be elevated at our vocational schools, career centers, and adult education centers.

## Environmental Resilience and Ecosystems Services

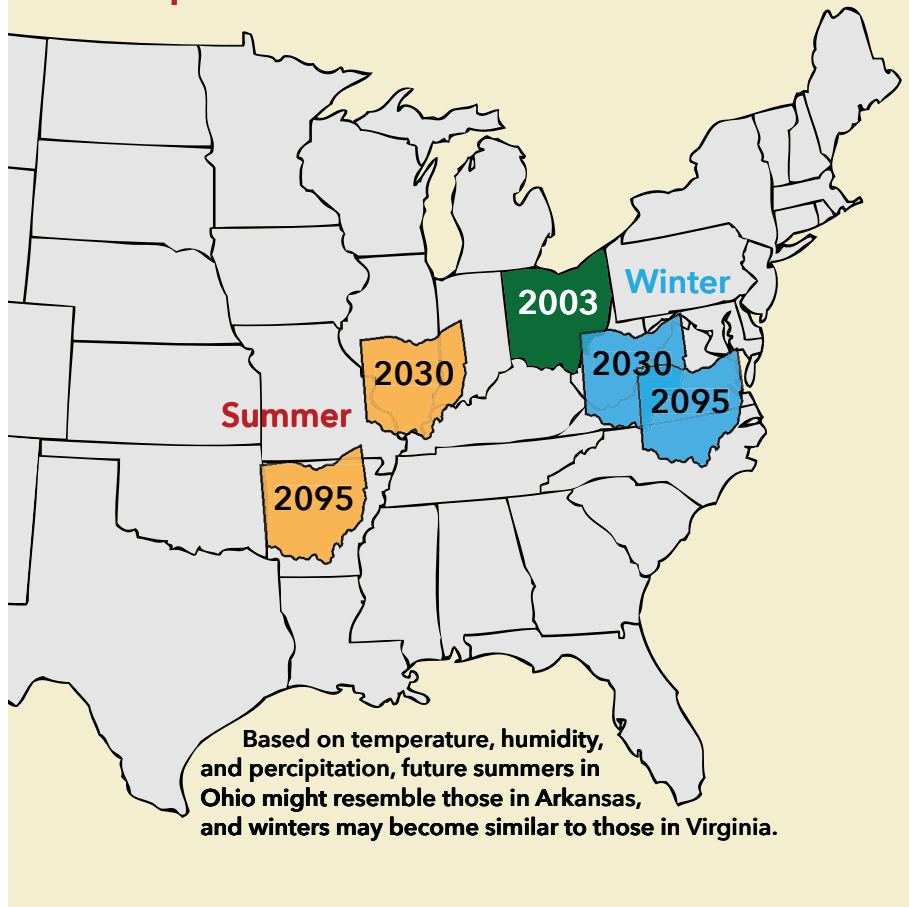
### WEATHER, CLIMATE, ENVIRONMENT

**CHALLENGE:** “Climate change” can be a polarizing term, but one thing farmers agree on is that weather patterns in recent decades have changed significantly. Late springs, wet springs, and dry summers have always been a threat to Ohio farmers. According to the fourth *National Climate Assessment Report*, the degradation of critical soil and water resources will expand as extreme precipitation events increase across our agricultural landscape.<sup>vii</sup> Sustainable crop production is threatened by excessive runoff, leaching, and flooding, which result in soil erosion, degraded water quality in lakes and streams, and damage to rural community infrastructure. These predicted impacts are already happening today. Thunderstorms are often much heavier, droughts often last longer, false springs threaten orchards, and abnormal





## How the Future Climate of Ohio Compares to Current Climates Elsewhere



weather events and climatic conditions are forcing farmers to adapt to challenges that are affecting their productivity and waterways.

**OPPORTUNITY:** Fortunately, opportunities are plentiful, because the cost of continuing the status quo is incalculable. We cannot continue to suffer debilitating rains and droughts, the loss and degradation of topsoil, or nutrient runoff into water supplies. We have choices and already are moving forward with incremental remedies. But this call to action outlines more-concerted and comprehensive strategies that showcase the economic benefits of ecosystem services like the adequate water, fertile soil, and

pest control that farmers don't have to buy.

Soil health is a factor in the two biggest environmental challenges addressed in this project: nutrient runoff into waterways and extreme weather patterns characterized by very heavy rainfalls and extended droughts. The 4R Nutrient Stewardship Certification Program, developed by a coalition of industry groups and institutions, provides a model for addressing nutrient runoff into water bodies across the state, serving 2.7 million acres, two-thirds of them in the Western Lake Erie Basin.<sup>viii</sup> Many farmers also are experimenting with winter cover crops, which can replenish

the soil and leave space in their root systems to absorb rain and hold water for periods of drought.

“Soil is a living entity,” says Dr. Rattan Lal, a renowned soil scientist and director of the OSU Carbon Management and Sequestration Center. He speaks of soil health with reverence: “Soil is where death is transformed into life. ... soil health is a journey, not a destination.” He adds, “Soil is instrumental to mitigating climate change, and healthy soil suppresses disease and needs less fertilizer. ... Agricultur- alists have the greatest control over the environment.”

### WATER QUALITY

**CHALLENGE:** Nonpoint-source nutrient runoff from farms into the Maumee River watershed, along with a variety of point-source discharges, has led to algae blooms in Lake Erie. The blooms in the lake's shallow Western Basin have on occasion shut down the intake for Toledo's water supply and have appeared earlier in the season in recent years. Grand Lake St. Marys in Mercer County and other water bodies have had similar problems in various corners of the state — including runoff into the Ohio River that is carried down the Mississippi to the Gulf of Mexico. But there's no one-size-fits-all solution: the various sites are in different parts of Ohio, with different geology, different soil types, and different types of agriculture. The role of agriculture in those areas may vary from place to place.

**OPPORTUNITY:** In other parts of the country, communities and farmers have collaborated on “ecosystem

SOURCE: HAYHOE AND WUEBBLES 2003 MODIFIED, WITH CREDIT TO GLISKA (UM)



services” projects. A Watershed Memorandum of Agreement in 1997 was designed to protect the 1.4 billion gallons of water per day that New York City draws from 19 upstate reservoirs in the Hudson River watershed. The plan saved the city billions of dollars in filtration costs by preserving sensitive reservoir buffer lands and assisting farmers in adopting practices that reduce runoff. In many ways, the ecosystem services arising from those practices set the stage for recognizing the value that farmers offer to the environment as they produce food, feed, and fiber. Ohioans are beginning to understand that, in order to have both a stable food supply and a safe environment, they may have to share the costs of a transition to more-sustainable agriculture practices. It is in the best interest of urban water utilities, and of Ohio residents, to work with farmers upstream.

## WOODLANDS

**CHALLENGE:** Ohio’s predominant forest type is oak-hickory — dominated by tree species that produce strong, valuable, desirable lumber and other products, while also providing high-volume, nutritious mast crops for many of Ohio’s iconic wildlife species. Ohio is beginning to see declines in oak-hickory regeneration, due to changes in timber harvesting practices, lack of use of prescribed fire, and a dramatic increase in pests, pathogens, and non-native invasive species. Losing this forest type will have major implications on the forest economy as well as wildlife populations and diversity.

**OPPORTUNITY:** Forest managers are working to restore oak-hickory forests in southeastern Ohio, part of the oldest and most biologically diverse forest systems in North America. Through the Joint Chiefs’ Landscape Restoration Partnership, the federal Forest Service and Natural Resources Conservation Service are working with the ODNR Division of Forestry, OSU Extension, and others to begin reversing this trend on public and private woodlands across the project area. This is a good first step, but more must be done to improve the resilience of forests and the ecosystem services they provide.


## REGULATORY CLIMATE

**CHALLENGE:** Farmers sometimes feel under attack by the regulation of their profession and practices. Often, it’s not so much the intent of the regulation that bothers them, but the way it is presented and enforced. Agriculture is a highly regulated industry, and farmers want a voice in developing solutions for problems. Whether it’s new restrictions on use of fertilizers, use of land with standing water, or controls on how they raise animals and process food, farmers recognize that regulation is part of the solution, but they emphasize that there is no simple or quick fix and that solving problems in silos doesn’t work. Going forward, policy frameworks need to be harmonized, and overlapping and contradictory regulations need to be harmonized.

**OPPORTUNITY:** Farmers feel that a better regulatory strategy would ensure their voices are shared with those of other collaborators and

would be aimed at long-term, comprehensive solutions that benefit the environment, the public good, and farmers. Collaborative approaches could also be applied to food-safety regulation in ways that allow flexibility and encourage new techniques without compromising safety standards. Other topics that frequently came up in the preparation of this call to action include: the waters of the United States, licensing for fertilizer application, Food Safety Modernization Act, restrictions on rabbit processing, hurdles for mobile meat processing, and workers compensation.

At a sustainability conference in Columbus in 2014, an Ohio farmer in a panel discussion of agricultural runoff started his presentation by showing his yearly budget for corn, soybeans, and wheat — seeds and inputs, land rent, harvest assistance, anticipated commodity prices, etc. He said that farmers are concerned about the environment and want to do the right thing, and the “right thing” also includes making a living and supporting a family.

An urban resident told the farmer she was not aware of farmers’ financial challenges. She wondered if consumers and their demand for cheap food are partly culpable for the Lake Erie algae blooms and other environmental problems related to agriculture. She suggested that all Ohioans share culpability in nutrient runoff and should perhaps share in the costs of fixing the problem. As farms increase the ecosystem services they provide for the public good, Ohio can create policies and programs that recognize the value of those services. 



## PATHWAYS TO OHIO SMART AGRICULTURE



*It's a model with incentives to help farmers harness the full range of goods and services that they can sustainably produce from the land.*

**W**ell-managed agricultural landscapes can produce food, feed, fiber, energy, and a wide range of ecosystem services that generate environmental, economic, and social benefits. Achieving these “solutions from the land,” however, requires an immediate start on a new, 21<sup>st</sup>-century approach to land management and problem solving. This model is characterized by broad initiatives through which multi-stakeholder collaboratives take an integrated approach to food system challenges, rather than the siloed management of the past. The model we envision brings production, environmental, food, and nutrition policies into harmony and streamlines overlapping and contradictory regulations. It's a model in which markets compensate land managers for ecosystem services that benefit farmers and the public. In short, it's a model with incentives to help farmers harness the full range of goods and services that they can sustainably produce from the land.

Achieving this transformation in land management cannot be done by decree. Instead, it requires commitments, investments, and participation on the part of government, business, industry groups, academia, non-governmental organizations, landowners/managers, consumers, and many other stakeholders in an emerging ecosystem services model. It requires new regulatory approaches that are less adversarial but achieve the same ends in ways that are flexible

enough to encourage new, creative solutions. It requires engaging the marketplace in new and flexible ways that create economic incentives for sustainable management of natural resources and develop markets for agricultural goods that help both people and the land.

These key themes — which encompass collaboration, interconnectedness, proactive regulation, ecosystem markets, stewardship, and benchmarks/results — enable broad, landscape-scale planning and integrated strategies that deliver multiple solutions from the land to meet the broad needs of landowners and society.

What follows is a *comprehensive, interconnected* set of recommendations to transform Ohio's agricultural system to achieve the full range of goods and services that can be sustainably delivered from the land. We do not identify priorities because our recommendations are designed to work together. This is a crucial point that we must continue to stress. We have an agricultural *system*. If weather patterns or nutrient runoff affect production, they also will affect distribution, price, and availability. As consumer preferences evolve, they may force changes in production and processing; they may even affect the environment. We can't address a challenge in one segment of the agricultural system without considering how other segments will be affected. Thus, an integrated vision and action plan is essential.



These recommendations are organized under three interrelated work streams designed to:

- **Reduce hunger and improve nutrition by supporting the production of fruits, vegetables, animal proteins, and food-grade grains for human consumption.**
- **Create jobs and generate economic growth by diversifying and sustainably intensifying production and processing of food, feed, fiber, and renewable energy.**
- **Augment ecosystems services to improve the environment, enhance the resilience of agricultural and forested landscapes and improve the farmer's bottom line.**

Evolution and continuous improvement alone, long hallmarks of Ohio agriculture, will not get us there. This is a huge challenge, and it requires immediate steps toward transformational change. Policy, institutional research, industry action, investments and the innovation of individual farmers must all come together in this effort.

## Hunger and Nutrition

The startlingly high numbers of food-insecure Ohio families and children may suggest a disconnect between what Ohio farmers produce and what Ohio residents need, but there is no simple solution to hunger. Rebuilding Ohio's local-food processing and distribution infrastructure will create new opportunities for farmers, create jobs, strengthen local economies,

and make local food more widely available in stores and institutions. But it will not, by itself, feed families that are food-insecure. Families will still need to pay for the Ohio fruits, vegetables, and animal protein — which could mean subsidizing production, subsidizing the purchase, or, in the long run, developing an economy in which everyone can afford to eat. In the meantime, here are the recommendations aimed at addressing hunger, nutrition, and local food systems:

- **Form and properly resource a Farm, Food, and Health Partners Alliance.**  
To ensure the recommendations we've described are addressed, Ohio needs a non-governmental organization with members representing farmers, food and nutrition advocates, environmental organizations, food industry leaders, land grant universities, government agencies, and others as policy reviewers and advocates.
- **Align state agencies toward effective and coordinated food, health, and agriculture programs.**  
Whether through creation of a single comprehensive agency or greater collaboration among existing agencies, Ohio should ensure that food, health, and agriculture programs are working toward common goals.
- **Restore the Ohio state government's role as a marketer and champion of agricultural goods and services.**  
A vast majority of the Ohio Department of Agriculture's (ODA) functions are regulatory. Of the department's \$82 million budget, commodity and market-

ing programs make up less than \$2 million — most of which comes from producer assessments or special taxes on the products. To meet the needs of next-generation agriculture and expand the agricultural processing capacity, the ODA will need to balance its regulatory authority with an economic-development role.

- **Restructure the ODA Ohio Proud program to make it relevant and engaging to today's consumers, institutional food-service markets, and commodity-scale agriculture.**  
Ohio Proud is the only program that promotes Ohio-produced goods to the public. With a 30-year history of rising and falling state support, currently at \$79,000 per year (or 0.09 percent of the budget), it must grow significantly to accommodate an increase in local food, new markets for specialty grains, and other emerging opportunities.<sup>ix</sup>
- **Quantify and regularly assess demand for local food.**  
Ohio needs more processing infrastructure to meet growing institutional demand for local food, but we must quantify that demand to attract investment in facilities that can slice, dice, and butcher food for those institutions.
- **Quantify and regularly assess the food preferences of Ohio consumers.**  
Our workgroups cited a need for research into consumer food preferences. Growing demand for local food, healthful options, and sustainable production has changed what is sold in grocery



stores. Knowledge of emerging trends will help Ohio's food and agriculture industry.

- **Expand and remove barriers to institutional purchase of Ohio food and agriculture products.** Until recent years, all apples purchased by Columbus City Schools came from out of state. The food-service director found policy and market hurdles that made it difficult to buy from Ohio orchards, but persisted. Now the state's largest school district buys only Ohio apples. If local, state, and federal governments can remove purchasing policies that inadvertently create barriers to local food, farmers can produce more of what Ohioans need.
- **Grow more of what Ohioans need.** Ohio has the soils and climate to produce a great variety of food that Ohioans need. When the marketing channels and infrastructure exist, Ohio farmers will meet the demand.
- **Develop an independent "food-system finance authority"** A major barrier to scaling up Ohio food production is the lack of a financing mechanism to redevelop the sort of food supply chain that Ohio once had. A legal entity with the capacity to raise and manage funds for investment in local food aggregation, processing, distribution, and marketing infrastructure would open a door to new opportunities for any Ohio farmer.

- **Restore processing capacity and supply chains for Ohio-raised food.**

One of Ohio agriculture's most significant problems – and most lucrative opportunities – is a lack of sufficient supply chain infrastructure. Many Ohio school districts, universities, hospitals, and other large institutions are interested in buying locally grown food but want much of it to be sliced and diced, or for leafy produce to be separated and bagged. Potential demand is greater than current processing capacity.

- **Restore processing capacity and supply chains for Ohio-raised meat and poultry.**

The lack of processing infrastructure is particularly acute in the case of meat and poultry slaughter. Operators of Ohio meat-processing plants say their biggest barrier is a lack of skilled butchers and meat cutters. Small-scale producers need to schedule months in advance because a lack of qualified workers, and insufficient cold-storage limits the processing capacity.

- **Develop markets and supply chains that serve immigrant populations.**

Supply chain development needs to accommodate immigrants, whose needs may provide new opportunities for current farmers and for the refugees themselves. Goats, for example, are the primary meat source for many African and Asian immigrants, who now struggle to find local sources of traditional meats and other ethnic products.

- **Develop and fund a pilot, small-scale, mobile meat-processing program.**

Kentucky State University, collaborating with state government, developed a meat-processing trailer that serves producers at sites such as county fairgrounds. The ODA, which began work on a similar model 10 years ago, should rejuvenate its effort with a pilot project.

- **Improve access to affordable and nutritious food, especially in underserved communities.** State agencies collaborating on food, health, and agriculture programs should develop pilot projects — for example, mobile food markets, promotions of produce and meat at convenience stores, and efforts to double the value of federal Supplemental Nutrition Assistance Program (SNAP) benefits for food purchased at farmers markets.

- **Promote food as medicine.** Ohio spends 96 percent of its health dollars on care and 4 percent on prevention. Amy Rohling McGee, of the Health Policy Institute of Ohio, told the steering committee, "We view increased health care spending as bad. We spend a lot of time, effort, and money downstream, trying to fix the effects of a problem. We need to go upstream to prevent the problem."

- **Expand Ohio farmer outreach and advocacy to address food insecurity challenges.** Through the collaboration of state agencies and agricultural organizations, efforts are needed



to educate each other and the public about different aspects of the food and public health systems.

## Jobs and Economic Growth

Ohio's earliest settlers relied on agriculture for sustenance. In today's global economy, agriculture is no less important to the state: It will continue to feed the people; it will provide services from the land even while preserving and improving the soil; and it will be an economic powerhouse that creates jobs in our cities and rural areas. It will do these things as long as we keep sufficient land in agricultural production. That means ensuring we always have young Ohioans willing and able to work the land and pass it on — in an even more productive and healthy condition than it was before — to the next generation. It means having the workers and equipment to produce the food and harvest the crops, livestock, and timber. It means having the facilities to add value to those products in Ohio communities with Ohio workers, and to keep the revenues recirculating in local economies. Here are recommendations to help us realize Ohio's economic potential:

- **Welcome and support the next generation of farmers.**  
The average age of Ohio farmers has risen steadily for decades. Fewer people raised on farms are choosing careers in production. Land prices make it hard for young farmers to get into the field. Minority farmers and farmers with limited resources
- **Develop programs to assist young, underserved, and “new-American” farmers.**  
Immigrants are among the potential new farmers in Ohio. Nonprofit organizations in Cleveland already offer farm and market training to immigrants and refugees. More such programs that assist immigrants interested in farming are needed.
- **Develop programs to assist limited-resource farmers.**  
Establish a joint task force to explore possibilities for land grant universities to support limited-resource agriculture in a way that ensures prospective farmers, regardless of race, creed, or socioeconomic status, have access to land, loans, state and federal programs, and markets.
- **Promote training in schools, colleges, and prisons in support of the entire food system.**  
Ohio agriculture in the coming decades will need a larger and better-trained agricultural workforce, whether it be regular farm hands, seasonal harvest workers, laborers in food-processing facilities, or the whole range of related skills: mechanics, technicians, welders, equipment operators, builders, and electricians.
- **Create new agriculture education programs for adults, communities, and students.**  
Public schools should reinstate or strengthen agriculture-education programs. The National FFA Organization and 4-H programs are still widely available, but
- **Build human capital in the form of workforce development and community resources.**  
Similar programs, through community colleges and other entities, should promote the agricultural field and prepare adults for agriculture and food-related jobs.
- **Reform immigration policy to help fill agriculture jobs.**  
Two of the most labor-intensive, food-related challenges are the harvest of produce and work in processing plants. In both cases, the current workforce is dominated by immigrant labor. The future of agriculture in Ohio may depend in part on passage of a new federal immigration policy.
- **Ensure living wages for farm and agriculture-related jobs.**  
All of these initiatives should be aimed at ensuring that producers, farmworkers, and employees of supply chain businesses are not only well-trained but are ensured a living wage.
- **Support local food aggregation and processing to ensure ease of marketing for farmers.**  
As farmers look to expand or diversify — whether it be in local or specialty markets — they need to have clear marketing channels and confidence in a stable market for their goods.
- **Develop programs to assist young, underserved, and “new-American” farmers.**  
vocational agriculture programs should be, too – with on-the-job training opportunities and internships, with programs catering to those who aren't currently on farms.



## Produce Potential

Based on the 2016 State of Ohio Agriculture report, a 1 percent shift of 2016 grain acres to specialty food crops by 2050 would increase acres dedicated to specialty crops from 42,340 acres to 132,040 acres. Using 2016 yield data per acre, total production of food specialty crops would increase nearly 312 percent.

Specifically, production in millions of pounds:

Crop	2016 Production	2050 Production
Tomatoes	428 mil lbs	1335 mil lbs
Sweet Corn	115 mil lbs	358 mil lbs
Peppers	65 mil lbs	203 mil lbs
Apples	34 mil lbs	105 mil lbs
Pumpkins	93 mil lbs	290 mil lbs
Cucumbers	51 mil lbs	159 mil lbs
Grapes	11 mil lbs	34 mil lbs
Peaches	3 mil lbs	10 mil lbs
<b>Total</b>	<b>799 mil lbs</b>	<b>2493 mil lbs</b>

These estimates are rough, but illustrate how such a small change in grain acres converted to food specialty crops can increase local food production dramatically.

SOURCE: NASS, QUICK STATS 2016 (QUICKSTATS.NASS.USDA.GOV), WITH CREDIT TO BILL LYNCH (OSU - RETIRED)

- **Adjust state regulatory policies to be more collaborative and/or less adversarial.**  
Government models for food and facility inspection policies should focus as much on helping entities ensure safety as on enforcement.
- **Increase number of malt houses, grain mills, and other processing facilities to assist the brewing, distilling, baking, snack food, livestock feed, and other industries.**  
A small, on-farm Union County malt house for barley in 2016 led to what is believed to be the first

all-Ohio beer in a century. Ohio needs more facilities that can process barley, rye, and wheat for brewers and distillers. Markets for those and other grains — even if it's for feed — can revive production and bring additional crops into farmers' rotations. Likewise, companies such as Shagbark Seed & Mill in Athens have generated markets for organic corn and black beans.

- **Promote controlled-environment production for horticulture and floriculture.**  
Interest in controlled-environment

production systems for horticulture, aquaculture, floriculture, and fresh fruit and vegetable production is exploding as new technologies enable vertical and urban production systems.

- **Support development and expansion of aquaculture and creation of a processing and distribution supply chain for fish.**  
The potential for growth in Ohio's fish-farming industry is limited by a lack of processing capacity.
- **Promote new processing options and markets for Ohio wood products.**  
Ohio foresters want more opportunities to process wood for energy, bio-char, green buildings, and home furnishings.
- **Promote new processing options and markets for Ohio bio-products and the bio-economy.**  
Ohio is a leading producer of glues, adhesives, paint, soap/detergents, rubber and polymers, all of which have agricultural roots.<sup>x</sup> Value-added processing in Ohio keeps dollars here instead of sending raw commodities out of state for further handling.
- **Invest in rural broadband infrastructure.**  
Today's farmers need fast internet connections at home as they make complex marketing decisions, but also in the fields to assist in GPS-driven precision farming. Technologies and information sharing must be enabled via broadband internet service that is available statewide.





## Planting the seeds of a small-grain economy



*Middle West Spirits (Columbus, Ohio)*

It's widely known that cover crops are good for soil health and can make fields more resilient in times of drought and excessive rain. What's less clear is how to ensure such practices are as good for the farmer's bottom line as for the soil.

An answer to questions about this winter's cover crop may lie in next winter's hot toddy or Christmas ale.

As co-founder and distiller at Middle West Spirits in Columbus, Ryan Lang already works with Ohio farmers to grow non-GMO corn, rye, and other grains for his products. They are processed at Bluegrass Farms Inc. in Jeffersonville and Mennell Milling Co. in Fostoria. Lang, like some other Ohio distillers and brewers, wants to buy more grain from Ohio farmers.

"In distilling, lots of people are looking for different grains – spelt, millet, oats," he said. "It may be cheaper to get them out of state. Rye is a challenge here because there are not a lot of growers in Ohio. Most distillers go to Canada for it. But there's always potential for small grains, and lots of opportunities to change the patterns in Ohio for growth."

Lang hopes farmers who today talk about corn, soybeans, and wheat will someday be just as comfortable talking about rye, barley, and sorghum, or spelt, millet, and oats.

"Anything we can do to add value to those crops will make it more attractive for farmers to grow them,"

said Steve Maurer, former Ohio director of the USDA's Farm Services Agency. "It's an economic issue and a water-quality issue: Add value to small grains. If we develop markets for these grains, with prices posted at the elevator, farmers will grow it," even if as a secondary crop for livestock feed.


"Anything we can do to add value to those crops will make it more attractive for farmer to grow them," Lang added. "It's an economic issue and a water-quality issue to add value to small grains, such as low-protein soft red winter wheat used for distilling; like low-protein barley valued for brewing." In addition to the processors Lang uses, Ohio has had a few small malt houses open in recent years to process malted barley to brewers. But they are not sufficient to drive the market for grain production.

Even bakeries might have a need for rye, spelt, millet, and others. If there's a demand for it, there's an opportunity – and bakeries and breweries can create the demand.

*"Most distillers go to Canada for [Rye]. But there's always potential for small grains, and lots of opportunities to change the patterns in Ohio for growth."*

Lang sees infrastructure as the barrier to more cover crops and different types of grains. But he considers "infrastructure" to imply much more than processing and distribution facilities.

"We need seed developers," he said "And growers who can manage the seed. We need agronomy studies, research on the benefits of small grains. If you get into something in a substantial way, you need a foundation – a diversified infrastructure." Allow shifting storage without contamination.

"We need to think about our future and what is required for change," Lang said. 



## Environmental Resilience and Ecosystem Services

Farms and forests provide vital goods and services to society; we call them “ecosystem services.” The food we eat is a product of ecosystem services. But these lands also give society benefits such as clean water and air, wildlife habitat, and carbon storage. Market-based approaches to conservation are a cost-effective method to achieve environmental goals and sustain working and natural landscapes. Farmers also rely on and benefit from ecosystem services for such basic needs as adequate soil moisture, pest control, and healthy soils that support plant growth. Farmers can manage their land in ways that produce each of these services, avoiding expensive inputs that would otherwise be needed to replace them. These recommendations seek to nurture the ecosystem services that benefit both farmers and the broader society:

- **Diversify commodity production with identity-preserved or value-added products.** On-farm diversification includes tapping into markets for local

food, but also to regional specialty markets and options for adding value on-site. The new markets can strengthen the farm’s bottom line and greater diversity of crops can improve the soil.

- **Develop and implement a climate-smart action plan for Ohio agriculture.** The plan should identify specific vulnerabilities posed by increasingly erratic weather extremes and include a comprehensive adaptive-management strategy for Ohio agriculture.
- **Create and implement a new water quality strategy.** Such a strategy should include current public and private sector response initiatives and develop industry standards through a process with diverse stakeholders.
- **Identify pathways for accelerating and scaling up the delivery of ecosystem services to Ohio farms and from Ohio’s agricultural landscapes.** The City of Columbus has considered a program that would help farmers upstream from its water reservoirs manage the financial risks of reducing the nutrients applied to their fields

— which would in turn reduce the city’s water treatment costs. A similar nutrient trading program was established as a collaboration between Alpine Cheese in Holmes County and its Amish dairy producers upstream. These and other efforts need to be promoted as ways farmers can help communities and in which communities will share risk with farmers.

- **Through knowledge sharing, increase the use of precision farming technologies.** Universities, government agencies, and industry groups need to gather and disseminate information for farmers. Satellite technology has enabled advancements in precision farming, which allows application of only the amount of fertilizers or manure needed to suit the precise characteristics of the soil in different parts of a field.
- **Create a strategic forestry roadmap and strengthen programs to promote good management of woodlots on farms.** Most of Ohio’s privately-owned woodlands are not under an active forest management plan. Ohio should reform forestry policy initiatives to incentivize healthy forest management and consistent management standards across the state.
- **Harmonize tax incentives to protect working lands.** Woodland and farmland property tax incentives need to be harmonized to encourage proper forest management and integrated management of landscapes and to discourage the loss of forest



and farmland through conversion to non-agricultural uses.

- **Boost awareness of the role that farmers play in Ohio's economy and environment.**

Ohio's agriculture stakeholders should establish a speaker's bureau of farm leaders who can promote awareness about food insecurity and its connection with farming in Ohio; the economic and community benefits of the food and agriculture industry; and the importance of ecosystem services.

- **Create a network of government and private consultants to help develop a landscape-scale plan for ecosystem management.**

Such a network should be drawn from city, county, and state agencies.

- **Promote research and education about cover crops and other soil-enhancing practices.**

David Brandt, in 50 years of farming near Lancaster, has slashed fertilizer use and not tilled the soil. He is also a "Johnny Appleseed" of cover crops, sharing his experiences with farmers and others. His message — legumes hold nitrogen, rich soil absorbs carbon, and decayed roots leave channels in the soil that help absorb water — is one that needs to be more widely learned.

- **Track and publish statewide data in order to assure and celebrate continuous improvement.**

Ohio needs statewide baseline estimates of soil organic carbon, soil organic matter, and total

continuous living cover on agricultural lands so these categories can be tracked every few years.

- **Increase research and data on the handling and application of manure on fields.**

Researchers should learn from manure management programs elsewhere, such as those in Maryland and Virginia, and develop metrics in Ohio for proper handling and application.

- **Increase research and data on the services that come from the land.**

Data on current nutrient runoff from farms could be a benchmark for future reductions. These and other data could provide models that show the value of the full range of goods and services that can be delivered from the land, as well as to the farms themselves.

- **Promote policies and practices that support the ways in which agricultural land can provide public benefits: zoning policies, water resource protection, forestry and woodlot management, and tracing the sources of food.**

The state or universities should also pursue research and standards for a variety of policies and practices that support the ways in which agricultural land can provide public benefits from all types of farms.

- **Strengthen land use policies that keep land in agricultural production.**

The ODA's Office of Farmland Preservation should promote local and regional policies as well as manage the Ohio Agricultural

Easement Purchase Program.

Keeping land in agriculture is essential to the goals and recommendations we share and, while some economic trends make this kind of preservation easier today, Ohio needs to strengthen and fund farmland and forest preservation programs.


- **Develop a brand and recognition for Ohio farm products of all kinds, including ecosystem services.**

To complement improvements to the ODA's Ohio Proud program, Ohio farmers and organizations should develop a brand and recognition program for Ohio Smart Agriculture farms — leading the way for a public discussion of smart agriculture that engages wider communities of interest.

- **Create risk management programs.**

American consumers spend a smaller share of their income on food than just about any place on the planet. Because of that benefit, we should share the financial risk that farmers often face by providing incentives for practices that enhance ecosystem services. This could take the form of technical assistance for such things as cover crops, manure storage and handling, and cost sharing for variable rate nitrogen.

- **Increase awareness of ecosystem services.**

Develop information and education programs that explain and communicate the value and importance of ecosystem services and help to build stakeholder buy-in and support. 



## LET'S GET STARTED

**T**his call to action has emphasized that Ohio Smart Agriculture: Solutions from the Land is a long-term, comprehensive, multi-stakeholder collaborative that requires integrated leadership sowing seeds in three primary areas all at once. In that sense, there are no priorities because all the recommendations are priorities that will enable the transformation we envision for Ohio agriculture. We've identified challenges that present us with opportunities, and we have charted three pathways to develop those opportunities, and many of the steps needed to accomplish that.

In this chapter, we have identified four major initiatives and associated action steps as having the greatest potential to advance the recommendations in the previous section. They are “priorities” only in the sense that they are the kinds of short-term actions that can attract financing for our vision of mid-century Ohio agriculture and enlist stakeholders to join the quest

for a wider range of goods and services from Ohio's farms and woodlands. The order in which they are presented here does not connote any ranking. Together, these steps are interconnected and interdependent “launching pads” for Ohio Smart Agriculture: Solutions from the Land.

### Policy

#### MAKE OHIO AGRICULTURE AND THE FOOD SYSTEM A PUBLIC POLICY PRIORITY.

It is a startling statistic — a clarion call to action — that one out of five children in Ohio does not know where his or her next meal will come from. This sad reality, coupled with the fact that Ohio ranks in the lowest quartile nationally in health value, requires a re-examination of state priorities and the allocation of resources, programming and leadership to resolve these chronic life-shortening problems.<sup>xi</sup> The time for action is now. Ohio agriculture and the food system must become a

public policy priority. Towards this end, we recommend the following:

#### A. Form and properly resource a Farm, Food, and Health Partners Alliance.

An alliance of farmers, policy-makers, consumers, academics, advocates, and others should forge ongoing links among different aspects of the food and public health systems and serve as a hub for education, consumer and producer outreach, problem-solving, and advocacy for public policies to improve food security.

A recurring theme in this call to action is the growing disconnect between farmers and the general public. The gap is widened by an agricultural economy characterized by regional specialization and economies of scale. As the nation and state become more urbanized, people grow further removed from the farms of their family heritage. In the eyes of young children, food comes from the store; the farm is merely an abstraction. And so, as many go hungry, farmers are stunned to learn that the crops they grow to feed the world may not meet the needs of those in their home state.

An Ohio Farm, Food, and Health Alliance could change this. Bringing these disparate yet overlapping interests together could make agriculture not only an integral part of the state economy, but also a valued foundation of the state's culture. More importantly, and as a practical matter, such an alliance could shape the state's policy



agenda in a way that links agriculture more closely with food and hunger, and food more closely with health and health spending. Such an alliance could be a cohesive statewide voice to help shepherd this call to action and its recommendations into the future. Initial recommendations for areas of strategic direction and focus include:

- Establish a statewide food strategy that addresses food insecurity from producer to consumer and campaigns for a network of regional food supply-chain infrastructure. The strategy could build on the *2009 state-funded Ohio Food Policy Advisory Council plan* and integrate it with the *Ohio Food Policy Network Report: Mapping the Vision for the Future of Ohio's Food System*.
- Maximize use of and increase public commitment to programs that directly connect Ohio-raised food to low-income families (e.g., Produce Perks, prescription programs for local fruit and vegetables, Community Food Initiatives' Donation Station program, and WIC coupons at farmers markets).
- Enhance and expand commodity-led programs and producer efforts to increase demand, strengthen consumer trust and confidence, and minimize food system risks.
- Support livable wages in the food system, including income for farmers, farm labor, and other workers in the food industry.



- Examine the health benefits of trees and forests.
  - Invest in economic development (market and infrastructure initiatives) that will expand markets for agricultural commodities, improve access for underserved Ohioans, and provide workforce development in the agriculture and food industries.
  - Explore options to identify and assist food-insecure people who do not qualify for existing state and federal programs.
- B. Create an interagency task force to align state agencies toward effective and coordinated food, health, and agricultural programs.**
- Currently, leadership and programming for agriculture, food, health, and nutrition needs are spread across multiple agencies and departments in Ohio government. The result is many different interests working in silos to achieve narrow objectives, while failing to share their expertise and political support to solve broader economic,

nutrition, and public health challenges. A budget-conscious administration should seek efficient ways for agencies to jointly address agricultural, forestry, food, and health programming. We stand ready to facilitate such an analysis, which should be completed by a team of leaders appointed by the governor and drawn from the affected communities of interest, along with academic, government, and business leaders with expertise in these areas.

This team should give Ohio agriculture a higher public-policy profile — not just in terms of food and nutrition, but also in trade, economic development, workforce training, and jobs. Ohio has little voice in international trade and tariffs, which have great impact on farmers, but state officials can work to hold Ohio's congressional delegation accountable for representing agricultural interests. The team should also advocate for greater promotion of agriculture in economic



development initiatives; in developing a broader workforce; and in matching workers with jobs on farms, in processing facilities, and in mechanical and technical fields that serve agriculture.

**C. Restore the Ohio state government's role as a marketer and champion, as well as a regulator, of agricultural goods and services via the following initiatives:**

- Redefine and restructure the ODA's Ohio Proud program to make it relevant and engaging to today's consumers and institutional foodservice markets, and enhance the reach of Ohio Proud to make it accessible to both small-scale and commodity-scale agriculture.
- Promote and incentivize practices that increase ecosystem services that support Ohio farms, land, and water.
- Expand and strengthen the *Ohio Development Services Agency's Ohio Global Agriculture Trade Program*.
- Remove regulatory barriers blocking the introduction and use of high-octane/low-carbon biofuels.
- Support value-added processing of agricultural commodities and new markets for bioplastics and other bio-economy products through research and enabling policies.
- Curate multiple government and university data streams about soil, weather, and conditions into



one accessible, up-to-date resource.

- Fund agricultural education, basic research on maintaining soil and water quality, and intentional research to enable precision agriculture techniques.
- Address chronic labor shortages through collaboration with federal and state leaders.

**Diversity**

**DIVERSIFY AND SUSTAINABLY INTENSIFY THE PRODUCTION OF FOOD, FEED, FIBER, AND FUEL.**

As noted above, Ohio agriculture involves much more than the production of food, feed, and fiber. Ohio's farmers, livestock producers, and foresters also produce clean energy. They filter water, sequester carbon, enhance biodiversity, underpin national security, improve the environment, and create jobs and wealth. In short, they contribute to improved quality of life.

Supporting the sustainable development of our growing world provides a rare opportunity to define the next phase of Ohio agriculture. As the state's top-ranking industry for generations, agriculture can become even more relevant by adopting the three pillars of climate-smart agriculture: 1) sustainably increasing agricultural productivity and livelihoods (i.e., sustainable intensification); 2) enhancing adaptive capacity and improving resilience; and 3) delivering ecosystem services, such as sequestering carbon, and reducing and/or avoiding greenhouse gas emissions. To do so, Ohio agriculture needs to evolve by embracing the following foundational priorities.

- A. Discern and promote ways to integrate commodity production with diversified, identity-preserved, or value-added production in ways that enhance ecosystem services, farm and forest profitability, and public support for Ohio agriculture.**



Ohio agriculture has a rich heritage, but broad change is needed to maintain this status and engender ongoing public and policymaker support. We view diversification as a critical pathway to strengthen the future of Ohio agriculture. Achieving this would require collaboration among diverse agricultural interests on issues that have sometimes divided them, but the time is right to bring them together. Ohio Smart Agriculture: Solutions from the Land again stands ready to facilitate such a process — which in many ways is an extension of what we've already achieved to generate this document. The effort also should include multi-agency

government ex-officio partners; academics from land grant universities; representatives of agricultural organizations such as the Ohio Farm Bureau Federation, Ohio Farmers Union, and Ohio Ecological Food and Farm Association; and environmental organizations such as the Ohio Environmental Council and The Nature Conservancy.

A key element of this collaboration should be exploring ways to place ecosystem services at the foundation of agricultural production in Ohio, in terms of supporting both agricultural production and broader societal benefits, such as green space and water quality. A priority outcome of this work should be imple-

menting an ecosystem services action plan for the state to transition agricultural production to this approach, decreasing the need for inputs to production from outside of Ohio, and for widespread understanding of, and appreciation for, the ecosystem services that both support and are provided by Ohio agriculture.

- B. Build human capital in the form of workforce development and community resources, including access to land for rapidly changing rural and urban agriculture.**

Farming is hard work, and it takes a skilled workforce to grow, harvest, process, and

## Ecosystem Services



### Provisioning services:

Products or goods such as food, fuel, fiber, energy, fish, and wildlife.



### Regulating Services:

Ecosystem functions such as flood control, water filtration, and carbon sequestration.



### Cultural services:

Non-material benefits such as recreational, aesthetic, and spiritual benefits.



### Supporting services:

Fundamental processes such as nutrient cycling and photosynthesis that support the other three categories.

*Ecosystem Services, based on UNEP, Millennium Ecosystems Assessment. Source: Based on WRI materials*



### What does the forest industry mean to Ohio?

- Converting raw materials into various forest products resulted in \$9.95 billion in added value
- \$26.3 billion in total economic activity was generated
- Over 122,000 people were employed in 463 sectors of Ohio's economy
- Those workers earned \$6.54 billion in wages and benefits

### How does Ohio rank nationally in the Hardwood Industry?

- 1<sup>st</sup> in employment in the production of Wood Household Furniture – 4,168 employees
- 3<sup>rd</sup> in employment in the production of Pallets – 4,004 employees
- 8<sup>th</sup> in employment in the production of Cabinets – 4,176 employees
- 9<sup>th</sup> in employment in the production of Millwork – 3,754 employees

market the goods and services produced from agricultural landscapes. In examining the current state of Ohio agriculture, we have confirmed that Ohio's farmers are aging and the state lacks a comprehensive succession plan to ensure that the next generation of farmers will be equipped with the knowledge and resources they need to maintain economically viable operations.

We urge the development of a roadmap to guide intentional agricultural workforce development. Programs should be

developed to remove barriers and enhance aspiring farmers' access to land, capital, and knowledge. These programs should include mentoring and apprenticeship opportunities through which new and beginning farmers can work alongside experienced farmers who can train and influence future career decisions.

Of particular importance is the opportunity for land grant institutions such as OSU and Central State University to collaborate with community colleges, trade groups, and industry partners in

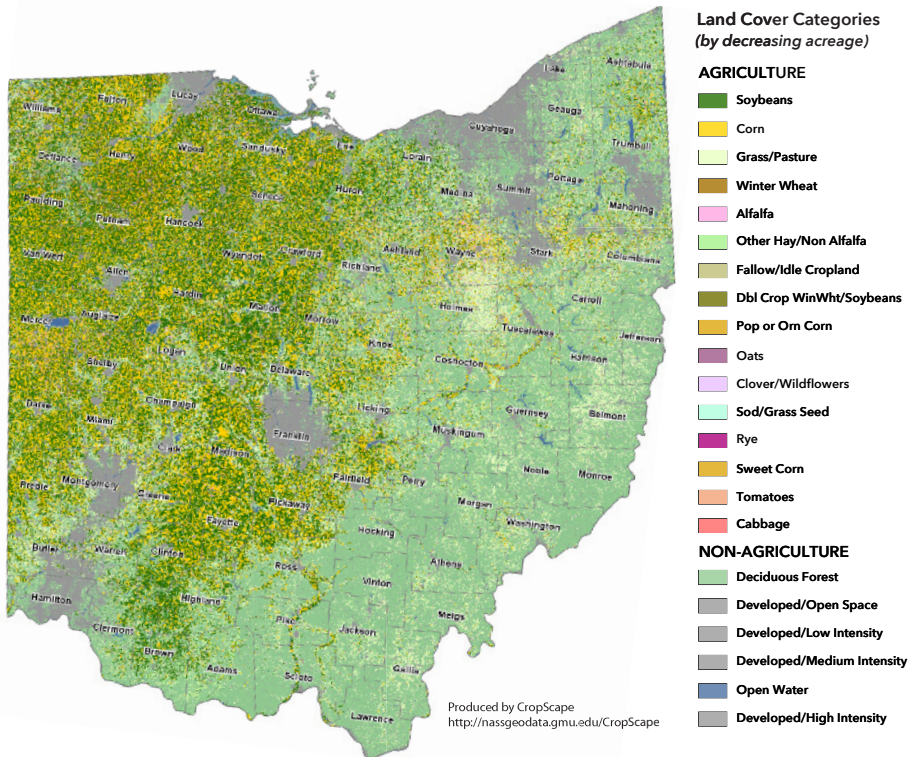
training non-traditional growers and workers such as veterans, limited resource producers, and immigrants who have prior experience and interest in farming. Other ideas worth considering are having vocational agriculture curriculums in more high schools and community colleges, developing farm internship work programs, and offering loan forgiveness in return for becoming an agricultural educator or farm apprenticeship mentor.

We strongly support these initiatives and ideas in our recognition that, in order to be successful, the next generation of farmers must have access to land, be offered livable wages, and be properly trained in their critically important craft.

**C. Create a strategic forestry roadmap to strengthen value-added woodland supply chains, and create new markets for residual forestry products.**

Forestry is a powerful force in Ohio's landscapes, with \$26 billion total economic impact, abundant forested lands, and many value-added supply chain processing inputs. However, the 72 percent of forested lands managed by individual owners in the state are badly under-supported, with only three forestry extension agents and 20 state foresters to provide knowledge-sharing and planning services to 88 counties and tens of thousands of forest properties. As fewer and fewer owners understand the value of their woods or create management





- Explore labor development, new production models, and diversified production and processing infrastructure to capitalize on the economic value of forestry products and relationships among land-oriented rural communities.

## Markets

### DEVELOP INFRASTRUCTURE AND USE INSTITUTIONAL PURCHASING POWER TO QUANTIFY AND INCREASE MARKETS FOR OHIO SMART FOOD.

For Ohio farmers to significantly increase production of local food, they need assurance that reliable markets and infrastructure are in place — in the form of processing, storage, and distribution for fruit, vegetables, meat, poultry, dairy, and eggs. As noted above, over the last half century, Ohio has lost much of the local infrastructure that enabled local food systems. The good news is that there is significant interest across the state in rebuilding that capacity. Re-creating those facilities, connections, and markets will not be easy, however. It will require financing, market studies, networking, and new business models, and much of that will have to occur even before new processing plants or cold-storage spaces can open for business. The goal is to reconstruct a whole *industry*, and not just a few more facilities.

An often-forgotten part of food system infrastructure is marketing. For farmers, that means a simple way of selling their goods into the

plans, consolidation and loss of knowledge and infrastructure — barriers familiar to other agricultural producers — reduces the power of forestry-adjacent industries which once enriched Appalachian Ohio (representing one-third of the state).

Several important elements must be considered in the creation of a strategic forestry roadmap to enhance resilience and productivity across forest and woodland landscapes. We must:

- Find funding and resources to hire state-level foresters and university extension agents who can expand the use and availability of professional forest management for state woodlands.
- Create programs to train and certify landowners and forest management consultants in woodland use and best practices.
- Strengthen forest health programs to promote the regeneration of valuable woods and protect against pests, invasive species, land-use fragmentation, and the impacts of climate change.
- Harmonize regulation and implementation of state law for forested lands by creating a unified, sensible, and consistently applied tax policy.
- Highlight the natural partnerships among agricultural growers who own woodlands or manage operations that would benefit from agroforestry techniques in order to solidify a whole-state land management system.
- Investigate value-added byproducts (such as biochar and compost) and other initiatives for carbon sequestration and soil health.



## Buckeye Bullseye



*The goal is to provide supplies, technical assistance, and training so families can both supplement their income and improve their children's nutrition.*

marketplace. For consumers, it means — among other things — confidence in the quality of the food they buy. Increasingly, consumers like to know where and how the food was produced when they assess quality. Local-food advocates and councils around Ohio have long talked about some form of branding, or standards, for local food.

The idea for Ohio Smart Food came to our steering committee by way of OSU's goal to increase the amount of local and sustainably sourced food served on campus to 40 percent by 2025. That initiative has a "Buckeye Bullseye" model of concentric circles around the target markets. We suggest a working definition for the concept of Ohio Smart Food as follows: "Food for human consumption that is grown in an environmentally sensitive manner by Ohio producers and is

immediately and conveniently available on an equitable basis to Ohio consumers with minimal handling and processing."

Exactly what the final local food standards will be, and whether Ohio Smart Food is the name for them, will be determined later. But the concept is consistent with the vision of *Ohio Smart Agriculture: Solutions from the Land*. With that in mind, we recommend the following actions as initial steps:

**A. Jump-start infrastructure development by quantifying current demand for local food and encouraging commitments of hospitals, schools, government agencies, and other public other institutions to buy locally.**

Large institutions can drive investment in facilities to aggregate, process, and distribute Ohio-grown produce and livestock products through the sheer volume of their purchases. As a major purchaser and provider of food for its network of campuses across the state, OSU's commitment creates new economic opportunities for those who wish to enter farming, especially aspiring limited resource and urban producers who have not found a way to participate and compete in the current system. OSU's Initiative for Food and AgriCultural Transformation (InFACT), through a grant from the W.K. Kellogg Foundation, is developing a network of low-income families with young children in the household, particularly in



communities of color that could grow food and sell it to OSU and other institutions and businesses in the community. The goal is to provide supplies, technical assistance, and training so families can both supplement their income and improve their children's nutrition.

The potential “market pull” and support from schools, hospitals, prisons, and other large institutional food providers highlights the need for processing and distribution infrastructure to meet the demand. Quantifying the value of current institutional demand will demonstrate that fresh local food, and the value added to it through processing, is an economic driver — not a passing fad. The studies and infrastructure-network models can be replicated or customized and scaled up across the state to help solve hunger and health challenges and simultaneously create jobs, stimulate economic growth, and generate wealth.

**B. Work with public, private, and university-based partners to develop an independent “food-system finance authority” that can attract and manage financing and work with market outlets to build new infrastructure.**

To do this effectively and comprehensively, Ohio needs development, support, and expansion of a local and regional food economy that includes administrative supply chain infrastructure (including food hubs and cooperatives), resources and services for food

and agricultural enterprise, and innovative approaches for selling to institutions (such as OSU's 40 percent local and sustainable purchasing goal), and other market outlets.

An Ohio local-food financing mechanism would need an intermediary between producers and the marketplace to enhance and maintain a dependable revenue stream for agricultural producers and regional food businesses. This entity could be a new quasi-public, public/private, nonprofit, or even for-profit organization that would ensure the development and dissemination of new funding resources.

An additional partner, such as an existing or newly created finance entity, is necessary to provide financing for the vital local and regional food infrastructure to service Ohio markets with viable and consistent sources of Ohio-grown food. Consideration of specific bond-financing options for particular components of new regional food system infrastructure should also be explored as a priority within the purview of such an entity.

Sound decision-making should be based on research to examine the widely held view that infrastructure limitations are the primary barrier to the scale-up of food production in Ohio.

**C. Develop and fund a pilot project for small-scale, mobile meat processing.**

A decade ago, the Ohio Food

Policy Advisory Council studied the feasibility of a mobile poultry processing unit, and the ODA began work on a prototype.<sup>xiii</sup> Ohio needs to revive those efforts, which have been successful in other states, and investigate mobile processing options for meat, poultry, and fish, which would allow a decentralized, collaborative, regional process to develop among agricultural producers. Special attention should be paid to exploring collaborative cold-storage options and encouraging regulatory flexibility without compromising food safety. For example, many farmers would like to see Ohio policy changed to permit on-farm or mobile processing of meat rabbits.

Ohio is very fortunate to have a respected meat inspection program to work with mostly smaller processing facilities. Given the ODA expertise and a well-established animal science program at OSU, it should be simple and expeditious to build on the past work and develop a pilot project for mobile meat processing. There is an existing model for this kind of project at Kentucky State University in Frankfort.

**D. Reinforce the value of Ohio agriculture by regularly evaluating the food needs and preferences of Ohioans.**

A frequently recurring topic on the steering committee was the need to know and understand the food preferences and needs of Ohio consumers. It arose in



Climate Driver	Vulnerabilities
Warmer temperatures, especially during the winter and at night during the summer	Additional heat-stress on humans and livestock
	Accelerated pace of growing degree day accumulation may lead to changes in regional crop rotations and yields
	Increase pressure from weeds, disease, and insect pests
	Changes in timing and coincidence of pollinator lifecycles will affect growth and yields.
	Northward shifts in optimum crop production zones
Increased precipitation, changes in seasonal precipitation and extreme events.	Degraded pasture and forage crop quality
	Soil movement and erosion.
	Field nutrient maintenance, loss, and degraded surface water quality
	Loss of field work days; Delayed planting and harvest
	Seasonal disruptions during critical threshold periods of crop and livestock development.

discussions of food insecurity and in discussions about the end uses of agricultural commodities. And it drove the conversations about growing demand for vaguely defined local and sustainable food.

OSU has long conducted simple but useful surveys of consumers' interest in buying local food, usually focused on direct marketing. But a broader and more comprehensive analysis of consumer preferences — across the state and in reference to all food purchases — would provide an invaluable benchmark for Ohio farmers, food purveyors, and others. Development of the survey should be a team effort among farmers, consumer groups, nutritionists, grocers, academics, state officials, and other affected parties. It should be conducted at regular intervals, perhaps every two years, as was the case with the earlier local-food surveys.

## Environment

### IMPLEMENT LANDSCAPE-SCALE CLIMATE-SMART AGRICULTURE STRATEGIES TO ENSURE SUSTAINABILITY AND ABATE AGRICULTURAL RUNOFF.

Agriculture is a science-based industry and science is telling us that nutrient runoff from agricultural operations is impairing water quality. Science is also telling us that the climate is changing and, coupled with increasingly erratic weather, poses a major threat to Ohio agriculture and our vision of dramatically increased production of food in the state. The time for action is now.

Given that Ohio farmers and their agribusiness partners are respected stewards of the land, guardians of natural resources, and providers of high value ecosystems services, *Ohio Smart Agriculture; Solutions from the Land* endorses the following actions to address these twin challenges:

A. The state of Ohio and all stakeholders should, by 2020, formulate and oversee the implementation of a new state water quality strategy that includes current public and private sector response initiatives and meets the following goals:

- Nutrients are used in farming operations without negative environmental impacts.
- Ecosystem services are at the foundation of agricultural production in Ohio, both as the basis for supporting production and in the broader societal benefits of sustainable agricultural land management, such as green space and water quality.

In addition to strategies, desired outcomes, benchmarks and metrics to measure progress, the following elements should be included in the Ohio Smart Agriculture Water Quality Strategy:

- Develop standards for protecting water quality and aquatic ecosystems.
- Strengthen and expand locally led water-quality programming through conservation districts, including expanded technical assistance (public and private sector) to support sustainable farming.
- Establish and/or increase funding for government conservation cost share programs to incentivize the planting of fall cover crops (e.g., guaranteed minimum payments for cover-crop yield loss protection), offset the cost of



## VanTilburg Farms makes the most of the poop it's been dealt

**A**cross Ohio and especially in the western Lake Erie drainage basin, improving water quality is a big priority. One family farm is taking on this challenge and creating their own solution.

VanTilburg Farms of Celina, Ohio, goes back more than a century, when the great-grandfather of the current owners worked for room and board on a farm while saving up enough to purchase his own. VanTilburg Farms has evolved over the years, successfully following many markets.

The current operators – brothers Matt, Kyle and Luke VanTilburg – co-own 4200 acres of non-GMO row crops, a poultry fertilizer business, an excavation business, and an ag retail business. One of their newest ventures showcases their commitment to the land, soil quality and a prolific value chain.

In late 2018, they opened a 4,200-head dairy farm. MVP Dairy is a partnership between the VanTilburgs and McCarty Dairy LLC of Colby, Kansas. Their unique business perspectives align for collaboration on land, grain, manure management, and dairy experience. They will be part of the Dannon Pledge, with this new farm's specific production and management practices in sync with the needs of Dannon's giant yogurt plant in Minster, Ohio.

"It's about sustainability, it's about doing the right things," Luke VanTilburg said. "The sustainability part is a much bigger piece. The way we do things with no-till and cover crops is a pretty small percentage compared to conventional" acreage in Ohio.

Their farm made the switch to non-GMO two years ago and has been implementing no-till and cover crops for even longer. The fields are fertilized with the poultry litter they offer to other farms in the area. They take precautions and use saturated buffers to prevent water runoff on their fields.



*The VanTilburg Family*


VanTilburg Farms has volunteered to be part of the Great Lakes Restoration Initiative (GLRI) for a three-year study on phosphorus and nitrogen levels. The current levels are a fraction of the average in Mercer County and as the study comes to completion, the results could have a positive impact on the state.

"We felt we had a system and model that works – and taking care of the environment is one of the most important things we can do," VanTilburg said. "Water quality is at the top of everyone's mind. We have a solution and did not want to sit on our hands."

*"Water quality is at the top of everyone's mind. We have a solution and did not want to sit on our hands."*

The new dairy will uphold and increase water-quality standards. Cows will be raised in a positive, sanitary environment, with frequent manure flushing and constant ventilation to minimize pests. The manure will also go through a two-step system to separate solids from liquids; solids will be dried and handled like chicken litter. Meanwhile, liquids will settle in an anaerobic lagoon for nutrient dispersal and then be pumped through a central pivot to fertilize their crops.

Using all byproducts in the system allows the brothers to care for the environment, diversify their operation, and showcase their unique brand. In agriculture's "dog-eat-dog" commodity world, where primary consumers—millennials—have specific needs, they're finding their niche.

"What's the story that makes their dinner conversations different about the food they are eating?" Luke VanTilburg said. "You [agricultural producers] have to become a part of that story." 



precision nutrient application soil tests, and expand the construction and use of manure storage facilities and other nutrient remediation practices.

- Establish a manure transport program modeled after those in Maryland and Virginia to help poultry, dairy, beef and other animal producers cover the costs of transporting excess manure off their farms.
- Innovate and add flexibility to crop insurance programs to help producers of non-covered crops manage risk; incorporate measures that encourage producers to use and provide ecosystem services.
- Expand research to enable precision agriculture techniques that enhance ecosystem services, such as better managing nutrient flows and balances.
- Adopt “safe-harbor” provisions for early adopters and those that are trying to adapt.
- Include an enforcement mechanism for bad actors and noncompliant producers.

We take note of the leadership that Ohio’s soil and water conservation districts and their partners are providing in this area and hope these collaborations on proactive and pragmatic water quality strategy are productive.

**B. Develop and implement a climate-smart action plan for Ohio agriculture to help farmers adapt, improve**

**resilience, and deliver products and services that mitigate climate-change impacts.**

To develop an array of solutions that enable Ohio agriculture to become “climate smart” — to sustainably intensify and diversify production on farms, grazing lands, and forest; to adapt, improve resilience, and mitigate impacts — we propose that a statewide, multi-stakeholder group be convened to build on our steering committee’s work in the following ways:

- Conduct a climate opportunity and vulnerability assessment.
- Create a “futuring” document for Ohio that identifies the specific vulnerabilities posed by increasingly erratic weather extremes and a changing climate.
- Develop a comprehensive adaptive-management strategy for Ohio agriculture.
- Develop and implement an ecosystem services action plan that will enhance the resilience of Ohio agriculture.


The following elements should be included in a climate-smart action plan for Ohio agriculture:

- Climate-smart agriculture production systems
- Conservation systems and practice
- Risk management strategies
- Infrastructure improvements
- Decision support tools

- A program to recognize climate smart farms, grazing lands, and forests.

Several other states across the country, including California, Florida, Maryland, Missouri, and North Carolina, have begun to develop and implement climate-smart agriculture strategies. Ohio should do the same to protect and enhance the resilience of Ohio agriculture for decades to come.

**C. Track and publish statewide progress data in order to assure and celebrate continuous improvement.**

There is an overarching intention of improving soil health and achieving carbon neutrality (zero emissions) in agricultural production over time and asserting that agriculture can become, on balance, a strategy to mitigate challenges with both climate change and water quality — and not just a source of related problems. Therefore, we propose establishing statewide baseline estimates of soil organic carbon, soil organic matter, and total continuous living cover on agricultural lands, such that progress in these categories can be tracked and published to support continuous improvement in the conservation and re-carbonization of Ohio agricultural soils. Once baselines are established, new studies every two or three years would be sufficient to discern progress, or lack thereof, in these critically important statistics. 



## JOIN US!

**E**nabled by a grant from the W.K. Kellogg Foundation, Solutions from the Land, a national organization dedicated to advancing land-based solutions to global challenges, and OSU's InFACT teamed up to support and facilitate *Ohio Smart Agriculture: Solutions from the Land*. Through extensive dialogue and collaboration with a wide cross section of stakeholders, we have formulated a mid-century vision for Ohio's food system and agricultural economy. With input and guidance from these partners, we have also created a roadmap to achieve the vision for delivering a wider range of goods and services from the land.

Some of the actions we propose are immediate initiatives that can accelerate and energize a broader and more robust response to the mega challenges facing Ohio today. Others are longer-term strategies that require further vetting and enhancement, along with integrated and landscape-scale planning.

In advancing these findings and recommendations, we know that our work is far from complete. For our vision and mid-century goals to be realized, this call to action must be implemented. This can only happen if those who share a common vision engage all communities of interest in a shared clarion call to action.

Toward this end, we invite all farmers; philanthropic, business, community, and non-governmental organizations; academic and government partners; and advocacy groups that work at the intersection of land, food, health, and the environment. We ask that you join us in the actionable steps we've described that will help reduce hunger and improve nutrition; create jobs and generate economic growth; improve the environment; and enhance the resilience of agricultural and forested landscapes.

Going forward, the implementation phase of this initiative will continue to be guided by a self-directed steering committee composed, we hope, of leaders who step forward from each of the communities of interest that have been engaged so far. Three organizations have partnered in providing backbone support for the effort so far and are willing to continue into implementation: Solutions from the Land (including operating, adminis-

trative, and fiduciary support); the OSU Initiative for Food and Agricultural Transformation (bringing expertise from across the university and its network leadership beyond), and Ohio State University Extension (providing a two-way connection with Ohioans in all 88 counties). We invite willing, able, and respected leaders from across the diverse Ohio agricultural and food system landscape to join us as core partners in advancing this vision and achieving expected outcomes.

In times of changing climate, markets, and preferences, the defining mission of *Ohio Smart Agriculture: Solutions from the Land* is to:

- Help farmers adjust to new weather patterns, nurture the land, clean our air and waters, and provide a healthy ecosystem for future generations.
- Reconnect consumers with agriculture; improve health, food access, and nutrition for Ohioans; and celebrate the importance of strong, vibrant farm communities and farmland.
- Build new opportunities and infrastructure for a more diverse and prosperous farm economy in which Ohioans feed Ohio and the world.

Evidence of transformational change in Ohio's food systems and agricultural economy is emerging across the state. Please join us in nurturing and growing these foundational efforts!

## About Solutions from the Land



Solutions from the Land is a nonprofit corporation focused on land-based solutions to global challenges. Its mission is to identify and facilitate the implementation

of policies, practices, and projects at a landscape scale that will result in land being sustainably managed to produce food, feed, fiber, and energy while protecting and improving critical environmental resources and delivering high value solutions to combat climate change. The president is Ernie Shea ([eshea@SfLdialogue.net](mailto:eshea@SfLdialogue.net)). For more information, see [www.sfldialogue.net/SFL/SfL\\_Vision.pdf](http://www.sfldialogue.net/SFL/SfL_Vision.pdf)



## About InFACT



The Initiative for Food and Agricultural Transformation (InFACT)

is a transdisciplinary Discovery Theme program at OSU aimed at designing and implementing sustainable food systems, which are defined as achieving a balance of ecology, economy, technology, and culture, and to promote the overall well-being of people, animals, and the natural environment. The InFACT mission is to transform the way we grow, process, and distribute our food, leading to vibrant, sustainable, and resilient agriculture that places nourishing food at the center of just and vital communities in Ohio and beyond.

The program is co-led by faculty director Casey Hoy ([hoy.1@osu.edu](mailto:hoy.1@osu.edu)) and executive director Brian Snyder ([snyder.1534@osu.edu](mailto:snyder.1534@osu.edu)). For more information, see [discovery.osu.edu/infact](http://discovery.osu.edu/infact).

## About OSU Extension

OSU Extension is commonly referred to as the “out-reach arm” of the university, having offices in all 88 Ohio counties. Because its employees live and work in the county they serve, they have a genuine connection both to the people of Ohio and the state’s land grant university. Its current priorities are health and wellness, thriving across the lifespan, workforce development, sustainable food systems, community capacity building, and environmental quality. Extension’s purpose is to translate and disseminate scientific knowledge in a way that is beneficial to the people of the state. Historically, this has occurred through workshops, seminars, field days, and one-on-one consultation. Today, Extension is also working in partnership with communities to co-create solutions to local problems. The director is Roger Rennekamp ([rennekamp.3@osu.edu](mailto:rennekamp.3@osu.edu)). For more information, see [extension.osu.edu](http://extension.osu.edu).

## Acknowledgements

### WORK GROUPS

The steering committee would like to thank the scores of agricultural, forestry, conservation, academic, and business leaders who have participated in this dialogue to date. During the period of 2017-2018, four workgroups, comprising a diverse cross section of supporting partners, forged consensus on initial steps necessary to ensure the realization of our vision and produced reports outlining their findings and recommendations. In producing this vision for Ohio agriculture, the steering committee drew heavily from the products of each workgroup. A [list of workgroup participants and their reports](#) can be viewed at [www.ohiosmartag.net](http://www.ohiosmartag.net).

### SUPPORT

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## Glossary

**Climate change** – Climate change is a consistent and long-term change in the usual weather found in a place. This could be a change in how much rain a place usually gets in a year, or it could be a change the usual temperature for a month or season. Weather can change in just a few hours; the climate takes many years to change.

**Commodity** – A standardized product sold in a competitive market that encourages the lowest price possible and in which the source of the product is irrelevant.

**Ecosystem services** – Farms, ranches, and forests provide vital goods and services to society that are called “ecosystem services.” These services offer additional benefits to society beyond typical agricultural products, such as clean water and air, wildlife habitat, and carbon storage. Market-based approaches to conservation are a cost-effective method to achieve environmental goals and sustain working and natural landscapes. Farmers also rely on ecosystem services for such basic needs as adequate soil moisture, pest control, and healthy soils that support plant growth. Farmers can manage their land in ways that produce each of these services, avoiding expensive inputs that would otherwise be needed to replace them.

**Low food security** (14.8 percent of Ohio households, 2014-2016, ERS) – Conditions in which individuals or families may need to make trade-offs between basic needs (such as housing or medical bills) and purchasing nutritionally adequate foods, with diet quality suffering.

**Very low food security** (6.3 percent of Ohio households, 2014-2016, ERS) – Consistently living with malnutrition and hunger, and missing meals on a regular basis.

**Infrastructure (as in local food)** – Generally, the aggregation, processing, and distribution services used to get products from farm to market. It can include food hubs, cooperatives, slaughterhouses, produce terminals, and other facilities. The term is sometimes expanded to include marketing, land, equipment, and labor.

**Local food** – Food produced within a certain geographic area. Definitions in terms of distance varying from an hour’s drive to a day’s drive to 100 miles to 400 miles, but a key quality that people seek is the chance for the producer and consumer to know each other and perhaps to have met, which is sometimes called civic agriculture.

**Ohio Smart Food** – Food for human consumption that is grown in an environmentally sensitive manner by Ohio producers and is immediately and conveniently available on an equitable basis to Ohio consumers with minimal handling and processing.

**Resilience** – The capacity of an agriculture and food system to absorb or withstand small disruptions (e.g., a year with low prices for products or adverse weather) and adapt to large disruptions (e.g., permanent and profound changes in global markets, climate, or technology) without losing its structure and functions (producing food, fiber, and more). Resilience requires self-organization, learning and adaptation; the grist for adaptation is diversity.

**Specialty crops** – Defined in the 2014 Farm Bill as “fruits and vegetables, tree nuts, dried fruits, horticulture, and nursery crops (including floriculture).”

**Sustainable (social, economic, environmental)** – Defined in InFACT’s strategic plan as “Achieving a balance of ecology, economy, technology, and culture to promote the overall well-being of people, animals, and the natural environment.”



## 50 x'50: Pathways to Ohio's Mid-Century Food System and Agricultural Economy

1. Form and properly resource a Farm, Food, and Health Partners Alliance.
2. Align state agencies toward effective and coordinated food, health, and agriculture programs.
3. Restore the Ohio state government's role as a marketer and champion of agricultural goods and services.
4. Restructure the Ohio Department of Agriculture's Ohio Proud program to make it relevant and engaging to today's consumers, institutional foodservice markets, and commodity-scale agriculture.
5. Quantify and regularly assess demand for local food.
6. Quantify and regularly assess the food preferences of Ohio consumers.
7. Expand and remove barriers to institutional purchase of Ohio food and agriculture products.
8. Grow more of what Ohioans need.
9. Develop an independent "food-system finance authority."
10. Restore processing capacity and supply chains for Ohio-raised food.
11. Restore processing capacity and supply chains for Ohio-raised meat and poultry.
12. Develop markets and supply chains that serve immigrant populations.
13. Develop and fund a pilot, small-scale, mobile meat-processing program.
14. Improve access to affordable and nutritious food, especially in underserved communities.
15. Promote food as medicine.
16. Expand Ohio farmer outreach and advocacy to address food insecurity challenges.
17. Welcome and support the next generation of farmers.
18. Develop programs to assist young, underserved and "new-American" farmers.
19. Develop programs to assist limited-resource farmers.
20. Promote training in schools, colleges, and prisons in support of the entire food system.
21. Create new agriculture-education programs for adults, communities, and students.
22. Build human capital in the form of workforce development and community resources.
23. Reform immigration policy to help fill agriculture jobs.
24. Ensure living wages for farm and agriculture-related jobs.
25. Support local food aggregation and processing to ensure ease of marketing for farmers.
26. Adjust state regulatory policies to be more collaborative and/or less adversarial.
27. Increase the number of malt houses, grain mills, and other processing facilities to assist the brewing, distilling, baking, snack food, livestock feed, and other industries.
28. Promote controlled-environment production for horticulture and floriculture.
29. Support development and expansion of aquaculture and creation of a processing and distribution supply chain for fish.
30. Promote new processing options and markets for Ohio wood products.
31. Promote new processing and markets for Ohio bio-products and the bio-economy.
32. Invest in rural broadband infrastructure.
33. Diversify commodity production with identity-preserved or value-added products.
34. Develop and implement a climate-smart action plan for Ohio agriculture.
35. Create and implement a new water quality strategy.
36. Identify pathways for accelerating and scaling up the delivery of ecosystem services to Ohio farms and from Ohio's agricultural landscapes.
37. Through knowledge sharing, increase the use of precision farming technologies.
38. Create a strategic forestry roadmap and strengthen programs to promote good management of woodlots on farms.
39. Harmonize tax incentives to protect working lands.
40. Boost awareness of the role that farmers play in Ohio's economy and environment.
41. Create a network of government and private consultants to help develop a landscape scale plan for ecosystem management.
42. Promote research and education about cover crops and other soil-enhancing practices.
43. Track and publish statewide data in order to assure and celebrate continuous improvement.
44. Increase research and data on the handling and application of manure on fields.
45. Increase research and data on the services to agriculture that come from the land.
46. Promote policies and practices that support the ways in which agricultural land can provide public benefits: zoning policies, water resource protection, forestry and woodlot management, and tracing the sources of food.
47. Strengthen land use policies that keep land in agricultural production.
48. Develop a brand and recognition for Ohio farm products of all kinds, including ecosystem services.
49. Create risk management programs.
50. Increase awareness of ecosystem services.



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To learn more about the history of Ohio agriculture, please refer to the Center for Public History + Digital Humanities at Cleveland State University or the collected archives of Agricultural Census and survey data at the National Agricultural Statistics Service ([nass.usda.gov](http://nass.usda.gov)).

To learn more about Ohio's forested lands, please reach out to the Ohio Forestry Association.



**Ohio  
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