Michigan (Michigan State University)

Plan of Work for 2023-2027

Status: Final (Approved 9/23/2022)

Executive Summary Overview

Founded in 1855 as the Agricultural College of the State of Michigan, Michigan State University (MSU) has served as the model for the creation of the land-grant university system. While the challenges facing Michigan, the United States, and the world have certainly changed since then, the need for research and outreach continues perhaps even more so in light of the pandemic. Today we remain dedicated to the land grant mission of teaching, research, and outreach. Educating the next generation of farmers and those working in the agricultural industry remains our highest priority and provides the motivation for all that we do. We continuously strive for excellence and are proud to be ranked #10 for agriculture and forestry in the world, according to the 2022 Q.S. university rankings.

Producing some 300 different types of commodities, Michigan is second only to California in terms of its agricultural diversity. These industries range from field crops such as corn, wheat, and soybeans to fruits such as cherries, apples, grapes, and blueberries; to dairy, livestock, honey, and fish; and vegetable crops, along with turfgrass, ornamental trees, and flowering plants. The breadth and depth of Michigan agricultural enterprises require extensive research and outreach on numerous pests, diseases, invasive species, and other issues to remain competitive and vibrant.

Consequently, the industry also generates a significant economic impact for the state. The food and agriculture system accounts for $104.7 billion in direct, indirect and induced economic activity per year and approximately 805,000 jobs – or 17 percent of total employment in Michigan. Helping to ensure the continued prosperity of these operations and businesses, through timely research and outreach among other things, is critical to the financial vitality of the state. Dairy and livestock comprise the largest sector of the farm economy in Michigan, contributing about $5 billion total impact per year. Field crops are the second largest sector of the Michigan farm economy and an important input in livestock production. Fruit production is the third largest economic sector

Weather patterns vary tremendously across the state. Temperatures and precipitation patterns can be markedly different from the northern tip of the Upper Peninsula to the southern border of the Lower Peninsula. Soil types also run the gamut from sandy to rocky depending on geographic locations. Therefore, what works for a farm in Marquette may not apply to one in Benton Harbor, even if they are similar types of operations. Providing best practice guidelines and management recommendations in broad strokes is not all that feasible or practical in Michigan. Research and outreach must be regionally relevant to the industry. In order to meet all of these varying needs across the state, MSU operates 15 research centers throughout the state where the research is directly applicable to nearby farms or forests. All of the centers are strategically located, equipped and staffed to address a specific segment of the Michigan agricultural and natural resource industries. The centers also help to maintain strong connections to local communities, farmers, and industries at each location.

Surrounded by the Great Lakes, Michigan is also heavily defined by water. The water causes what is known as lake effect across Michigan and helps to moderate temperatures for modifying the growing season, creating many microclimates that allow Michigan producers to grow a wide variety of crops. Without those major bodies of fresh water, much of the state's agriculture, shipping and tourism offerings would not exist. Discovering ways to ensure environmental sustainability of agriculture and produce crops and livestock without contaminating the state's numerous waterways and rich natural resources remains a high research and outreach priority.

ADVANCING MICHIGAN AGRICULTURE

MSU AgBioResearch and MSU Extension have been instrumental in advancing agriculture in Michigan since the university's beginning. In fact, MSU AgBioResearch was founded as the Michigan Agricultural Experiment Station in 1888 as part of a nationwide network of research stations specifically established to advance agriculture technology. Today, the impact of this work expands across the nation and even worldwide.

The mission of MSU AgBioResearch is to engage in innovative, leading-edge research that combines scientific expertise with practical experience to generate economic prosperity, sustain natural resources, and enhance the quality of life in Michigan, the nation and the world. Our research spans from applied to fundamental, or more appropriately we often describe as "fundamental research with an intended outcome." All of our research is aimed at solving problems or creating a new opportunity. The approximately 300 AgBioResearch supported faculty researchers across campus strive to maintain a balance between basic and applied research and rely heavily on the input of their constituents in identifying research priorities.

MSU AgBioResearch has faculty members from across campus, including the following colleges: Agriculture and Natural Resources; Natural Science; Engineering; Veterinary Medicine; Social Science; and Communication Arts and Sciences. In addition, there are active collaborations with the Colleges of Law, Arts and Letters, Osteopathic Medicine and the College of Business.

Michigan State University Extension helps improve people's lives through an educational process that applies knowledge to critical issues, needs, and opportunities. For more than 100 years, MSU Extension faculty and staff members have been actively reaching people where they are – in their homes, farms, businesses, and communities – with research-driven education. We help people perform their jobs better, raise healthy and safe families, build stronger communities, and empower children to dream of brighter futures.

PARTNERING BEYOND MSU

MSU AgBioResearch and MSU Extension frequently partner with other Michigan entities to help drive progress. Together, we have created a statewide, cohesive plan that uses the MSU research capability and knowledge base to expand outreach. This plan fosters economic development, improved quality of life, a healthy environment, and a plentiful and secure food supply for Michigan residents.

Both organizations have long-standing traditions of working closely with Michigan commodity organizations to ensure that the research and outcomes are meeting the needs of their farmer-members, especially the emergent, pressing issues. The successes and accomplishments of these two organizations are greatly tied to close partnerships with each other, as well as state agencies,

commodity groups, extramural funding agencies, such as USDA NIFA, and other stakeholders, plus outstanding legislative support. Strengthening those bonds continues to be a priority.

MSU AgBioResearch and MSU Extension have a unique partnership with the Michigan Department of Agriculture and Rural Development (MDARD) on Project GREEEN (Generating Research and Extension to meet Economic and Environmental Needs), a cooperative effort to benefit plant-based commodity industries within Michigan. Project GREEEN has generated more than $2.5 billion worth of economic impact to Michigan over the course of its 22-plus years of existence. We also partner with MDARD, Michigan Farm Bureau, and eight industry organizations on the Michigan Alliance for Animal Agriculture (M-AAA) to conduct research to advance Michigan animal agriculture. Since forming in 2014, M-AAA has generated a $10 return on every $1 invested. These programs provide seed grant funding for applied research and Extension projects that enable many of the researchers to establish primary findings and equip them to go on to receive other larger grants.

We have many collaborative grants with institutions around the country. This is particularly evident in the USDA-NIFA SCRI program.

MSU is also dedicated to creating new opportunities for our industry and growers. In recent years we have initiated programs on hops (Michigan is now the fourth largest producer in the US), malting barley, industrial hemp and new fruit crops. Currently we are developing research and Extension programs to support the developing industrial hemp business and will continue to respond as the laws and opportunities surrounding hemp evolve.

MSU's Institute of Agricultural Technology (IAT) is celebrating 125 years of providing practical agriculture training for the next generation of students. While the first courses were developed for dairy management and learning to process milk and cheese, today IAT has 13 certificate programs available at 12 community college locations across the state. Demand for agricultural technicians is expected to continue to grow in the near future.

Merit and Scientific Peer Review Processes

All researchers and other personnel funded by MSU AgBioResearch and Extension are subjected to thorough annual reviews as mandated by Michigan State University. These processes are regularly reviewed to maximize effectiveness and to enhance the opportunity for employee development. For faculty and staff with departmental affiliations, all raises are based on merit and include reviews at both the department and college levels. In recent years, these reviews have been standardized to ensure consistency and transparency both within and among our cooperating academic units.

All AgBioResearch research project plans are peer reviewed at the department level and via AgBioResearch leadership on a five-year renewal cycle. The alignment with the USDA Knowledge Areas has been stressed in recent years. We have also updated our guidelines for plan preparation to increase the quality and relevance of the research. To improve the quality of the proposals submitted to competitive programs, we have continued to increase our investment in our Office of Research Support. Our staff now includes 4 FTE focusing on pre-award support, 2 FTE on post-award support, and 1 FTE in program evaluation and metrics.

MSU Extension uses several continuous processes that assist in the merit and peer review process. At the county level, the public, local government officials, advisory group members, extension council members, staff members, and industry experts are involved in both the stakeholder process and review of the county and individual agents' plans. Each of MSU Extension's Institute content area work teams review the county needs, agents' plans, and research to support these programs, as well as others that may reflect emerging trends. Collectively, these plans are reviewed by MSU Extension institute and district directors who not only evaluate them, but also use them in their regional and statewide presentations to describe future plans.

Stakeholder input: Action Taken to Seek Stakeholder Input

On a statewide level, in 2016 MSU Extension executed an Issues Identification process, whereby an online survey and a series of statewide focus groups elicited feedback from external stakeholders. The online survey resulted in 7,180 responses from our community. Results include a ranking of statewide priorities, as well as specific programmatic feedback. There were also 52 focus groups held across Michigan, including approximately 1,200 participants, resulting in the identification of priorities by stakeholders for each MSU Extension district. The data collected from this process will enable MSU Extension and AgBioResearch to identify community needs, priorities for the future, and relevancy of existing programs to direct efforts for the next several years.

To address more local or district needs, MSU Extension has created District Advisory Groups to help in gathering input and setting priorities. Local 4-H programs will also continue to utilize county expansion and review stakeholder advisory committees to guide the direction of the local 4-H program.

MSU AgBioResearch continuously gathers stakeholder input through regular interactions with commodity groups, agricultural and natural resource organizations, partner agencies and research center advisory groups. These interactions have significant impacts on our programming decisions. Of special note are Project GREEEN (Generating Research and Extension to meet Economic and Environmental Needs) and the Michigan Alliance for Animal Agriculture where stakeholders submit specific priorities and participate in the project review process.

Stakeholder input: Methods to Identify Individuals and Groups

The MSU Extension and AgBioResearch Issues Identification process utilizes statewide surveys and citizen focus groups to identify the major issues and opportunities in Michigan and assign a priority ranking to each. Also, through this process, additional focus groups were held targeting underrepresented audiences in MSU Extension programming, yielding input on how future program efforts can better meet the needs of these groups.

Regular interaction with the groups mentioned above: We sit on boards and committees that give us regular feedback on programs and priorities. We also strive to be accessible as needs arise.

Stakeholder input: Methods for Collecting Stakeholder Input

Through the Issues Identification process, MSU Extension and AgBioResearch elicited feedback from stakeholders via online surveys and community focus groups, yielding both quantitative and qualitative data on programming priorities.

To address local county or district needs, local staff regularly elicit feedback from stakeholders via open meetings and advisory committee conversations.

In order to keep our stakeholders informed on our response to COVID-19, we began bi-weekly Zoom calls with stakeholders in April 2020. These meetings provide our stakeholders with the opportunity to hear directly from leaders in the College of Agriculture and Natural Resources, AgBioResearch and MSU Extension on academic, outreach and research programs as well as the opportunity for our stakeholders to ask questions and make comments. In August of 2020, these meetings shifted to monthly update meetings and focus on an array of topics. We continue to have 30-40 stakeholders attend these meetings. Such meetings have proven to be an effective additional method for ongoing communication with our stakeholders.

Stakeholder input: A Statement of How the Input Will Be Considered

MSU Extension utilizes stakeholder input in the development of work team logic models that become the framework for individual educators and specialists to align with, as well as help to identify local needs that may be specific to a certain county or district. Issues Identification survey and focus group results have been used, and will continue to be used, to develop logic models for specific program priorities.

At the local county level, staff utilize stakeholder input and feedback to determine the direction of local programming.

Critical Issues

Environmental Stewardship and Natural Resources Management

Initiated on: Nov 26, 2019
State: Michigan

Term Length: Long-term (>5 years)

Michigan's natural resources are a fundamental asset for the state's future economic opportunities. Challenges concern how residents of the state can best benefit from its rich natural heritage without overburdening the carrying capacity of its natural systems and reducing opportunities for residents and visitors alike. Our natural resource programs improve public understanding, help landowners and communities use those assets for sustainable long-term social and economic development, and conserve natural resources for future generations. We will:

- Develop tools and technology to help Michigan's natural resource-based tourism industry grow by meeting consumer demands
- Determine how wildlife, fisheries, and natural resources areas respond to habitat management to encourage management for sustainable benefits

Science Emphasis Area
Bioeconomy, Bioenergy, and Bioproducts, Environmental Systems

Human Health, Youth, and Families

Initiated on: Nov 26, 2019
State: Michigan

Term Length: Long-term (>5 years)

Promoting well-being for Michigan's youth and families requires attending to individuals' physical, social-emotional, and behavioral health. To improve the health and safety of Michigan's adults, youth, and families, we developed broad and comprehensive research and education programs to address Michigan residents' needs. Youth development, community development, nutrition and food safety research and education, and family and parenting skills are important areas of focus. We will:

- Support Michigan residents in eating healthier, being better caregivers, and preventing and managing chronic health conditions through education
- Develop better models for the human health and human services sectors
- Study the function of nutrients and other components related to human health
- Improve management of financial resources by individuals and families through education
- Prepare youth for life and work

Science Emphasis Area
Education and Multicultural Alliances, Family & Consumer Sciences, Food Safety, Human Nutrition, Youth Development

Plant and Animal Production and Health

Initiated on: Nov 26, 2019
State: Michigan

Term Length: Long-term (>5 years)

Michigan produces more than 200 commodities, making the state second only to California in terms of crop diversity. Agriculture is now one of the fastest growing sectors of the Michigan economy. Animal agriculture and its associated products -- milk, meat, wool, eggs, cheese, and butter -- also make up a significant portion of Michigan's economy. We will:

- Increase farmers' success with protecting the environment, ensuring food safety, reaching new markets, and advancing agriculture through applied research
- Conduct research on management regimes for food crops, for combatting resident and newly emerging pests and pathogens that threaten crop and food production and mechanisms promoting resilience of agriculturally relevant plants to abiotic and biotic stress
- Conduct research on selecting animals with desirable traits and on new methods to combat diseases and parasites
- Study nutrition and animal management systems

Science Emphasis Area
Agroclimate Science, Environmental Systems, Sustainable Agricultural Production Systems

Secure Food and Fiber Systems

Initiated on: Nov 26, 2019
State: Michigan

Term Length: Long-term (>5 years)

Our expertise in biosystems engineering, food processing, and nutritional immunology is paving the way for the creation of new food products that offer Michigan residents food choices with greater health benefits. Engineering and processing advances will lead to greater cost efficiencies, enhanced food safety and security, and increased development of non-food products (e.g., biofuels, building materials). We will:

- Enhance the production and profitability of small-scale agriculture projects and improve community wellness
- Use educational processes to facilitate the incorporation of renewable energy into households, governmental offices, and businesses
- Increase the capacity to develop forest and agricultural-based renewable resources in ecologically and economically sustainable ways.

Science Emphasis Area
Agroclimate Science, Bioeconomy, Bioenergy, and Bioproducts, Environmental Systems, Food Safety, Sustainable Agricultural Production Systems

Water Quality and Quantity

Initiated on: Nov 26, 2019
State: Michigan

Term Length: Long-term (>5 years)

Michigan has more than 36 million acres of land with more than 11,000 inland lakes and 36,000 miles of streams. Assuring water quality so that the state's water resources support designated uses such as drinking, recreation, and ecological health is a long-term concern. We will:

- Increase participants' understanding of ecology, natural resources management and decision-making, ecosystems and processes, and contested issues
- Increase participants' awareness of the impacts their actions have on water resources
- Determine the best way to remove pollutants from soil and water and turn over these areas into safe, productive sites
- Keep Michigan's surface and groundwater clean and make all citizens aware of why this is a critical issue
- Ensure that a safe, secure and plentiful water supply is available for the state's citizens, industries, wildlife, and natural areas

Science Emphasis Area
Agroclimate Science, Environmental Systems

Workforce Development, Community Resource Development, and Innovation

Initiated on: Nov 26, 2019
State: Michigan

Term Length: Long-term (>5 years)

Successful and thriving communities combine knowledgeable and engaged legislators, businesses, community groups, and residents. Agricultural producers benefit from improving their business and

financial management skills, whether they raise dairy cows or grow blueberries. Marketing, distribution and other economic variables also play a critical role in the success and profitability of the state's agriculture and natural resources industries. We will:

- Assist entrepreneurs who develop and commercialize high-value, consumer-responsive products and businesses
- Research and provide education on international trade and development, economic policy, domestic and foreign policy, and community resource planning and development to help Michigan growers and producers navigate governmental regulations both here and abroad, as well as connect them with foreign buyers and markets
- Assist Michigan communities in making critical policy decisions and functioning more smoothly with citizen involvement.

Science Emphasis Area
Education and Multicultural Alliances, Family & Consumer Sciences, Sustainable Agricultural Production Systems