DAFVM Vision 2030 Final Task Force Report Template Guide
AI Task Force

Mississippi Agriculture and Forestry Vision Task Force

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Executive Summary

The AI Task Force is focused on technologies that assist Mississippians to produce more efficiently, conserve resources, and educate the workforce on effectively leveraging AI technologies, to pave the way for a more sustainable and prosperous agricultural sector. AI technologies have the potential to enhance multiple areas of Mississippians' agricultural practices. MSU plays a key role through educational programs like 4-H and FFA, hence helping prepare the next generation to implement new and developing technologies. This task force also emphasizes the importance of ethical AI use and regulatory frameworks to ensure responsible AI implementation. AI Task Force values an integrated and coordinated effort among MSU's researchers, teachers, and Extension service to reach its potential.

Key areas of AI- empowered solutions in DAFVM include:

- Specialty and commodity crops: Use of AI tools to enhance crop monitoring and management by allowing faster detection of diseases, abnormalities, and predictive models to forecast optimal harvest yield and crop quality.
    - Crop monitoring and management
    - Pest and disease control
    - Precision Farming

- Animal production: Use of AI tools to further advance the practices of nutrition and feeding management, animal reproduction management, aquaculture monitoring and production, disease prevention, and biosecurity.
    - Animal health monitoring
    - Precision Feeding
    - Behavioral analysis

- Forestry and bioproducts: Use of AI tools to enhance forest modeling, pest and disease detection, reforestation planning, timber harvesting, carbon sequestration analysis, and soil erosion predictions.
    - Forest monitoring
    - Sustainable forestry logistics
    - Carbon and conservation analysis

The task force addresses central focus areas that apply across all sectors such as workforce development, AI education, infrastructure expansion, and collaborative research. The report addresses barriers such as limited rural broadband access, high implementation costs, and digital literacy gaps. The report outlines short-term strategies such as implementing demonstration projects, delivering AI training through Extension and educational modules, and initiating youth-oriented AI camps. Long-term strategies focus on building statewide AI platforms, enhancing rural broadband access, developing virtual models for forestry and livestock, and establishing AI-focused micro-credentials and certificate programs. By bringing together innovation, education, policy, and community partnerships, the DAFVM Vision 2030 AI Task Force is helping shape a strong and forward-looking future for agriculture and natural resources in Mississippi. The strategies and ideas in this report are designed to help Mississippi not just keep up with new technology, building the path forward. The report is focused on getting the next generation ready to thrive in a world where AI is a part of everyday life. Mississippi is on track to stand out in using AI to strengthen agriculture, forestry, and animal production.

Challenges and Barriers
Adopting AI technologies in Mississippi faces several challenges, including the high cost of tools, sensors, and automation systems, especially for small-scale farmers and foresters—alongside limited funding opportunities. Many rural areas also lack high-speed internet, making it difficult to access cloud-based AI tools and real-time data. Additionally, there is ongoing resistance to AI adoption due to concerns about privacy, security, costs, and a general hesitation to shift away from traditional practices.

Key Goals and Objectives
Goals of the Mississippi Agriculture and Forestry Vision Task Force 2030:

Goal 1 (Crops & Forestry):
Promote AI tools for specialty and commodity crops to improve decision-making, productivity, and sustainability in agriculture and forestry.

Goal 2 (Animal Production):
Accelerate AI adoption to enhance animal health, nutrition, and productivity while advancing sustainable livestock systems.

Goal 3 (Forestry & Natural Resources):
Use AI technologies to support sustainable forest and wildlife management, conservation, and economic growth.

Recommended Bold Moves:

This section consists of some bold moves to advance the goals of this report and remove barriers that may get in the way.

Establish a Mississippi Agricultural AI Research Center
Position Mississippi as a national leader in agricultural innovation by launching a flagship interdisciplinary research center focused on AI in agriculture. This center will bring together faculty from agriculture, engineering, computer science, economics, and rural sociology to lead statewide efforts and compete for major USDA, NSF, and industry grants.

Create a State-Funded Mississippi Ag-AI Innovation Fund
Establish a competitive grant program to support collaborative AI pilot projects between farmers, researchers, and agribusinesses. Prioritize initiatives that benefit smallholder producers, underserved regions, and underrepresented communities. The fund can be structured to match private investments and stimulate innovation in high-need areas.

Develop a Statewide Agricultural Data and AI Infrastructure Policy
Design a comprehensive policy framework that enables secure, ethical, and standardized data sharing between producers, public institutions, and industry partners. Support the development of digital infrastructure such as rural broadband, field-based edge computing, and cooperative data hubs. Establish a state-level Ag Data Stewardship Board to guide responsible AI adoption and ensure data privacy and fairness.

Launch an Agricultural AI Certificate Program
Develop an interdisciplinary AI certificate for undergraduate and graduate students, focused on real-world agricultural applications. Students will learn applied AI skills—such as computer vision for crop health, predictive analytics for market trends, and automation tools—preparing them for a rapidly evolving agricultural workforce.

Create an AI Extension Corps
Establish a dedicated team of extension professionals trained in ag-specific AI technologies. These specialists will deliver field-based demonstrations, workshops, and technical assistance to increase AI adoption among producers and agribusinesses, especially in rural and underserved areas.
Design AI-Powered Tools for Smallholder Farms
Support faculty and student-led projects to create lightweight, user-friendly AI tools that address the unique needs of small farms. Tools should work in low-bandwidth environments and provide actionable insights for crop management, soil health, and pest detection without requiring high-end equipment.

Pursue a Statewide AI and Agriculture Innovation Initiative
Collaborate with state leaders to design a legislative funding package supporting AI research, education, workforce development, and infrastructure in agriculture. Similar to previous broadband and economic development initiatives, this package can position Mississippi at the forefront of ag-tech investment.

Host an Annual Mississippi Ag+AI Summit
Position MSU and the state as a national hub for agricultural technology by hosting a high-profile Ag+AI Summit. The event will convene researchers, entrepreneurs, producers, policymakers, and students to showcase innovations, share best practices, and drive future collaboration across the region.

Statewide Livestock Behavior and Health Databases for Machine Learning
Recognizing the need for high-quality, annotated datasets to train and validate AI models, Mississippi researchers are building centralized databases of livestock behavior, health events, and environmental conditions. These databases are populated through video, sensor, and producer-sourced data collected across diverse systems; from commercial operations to small cow-calf producers. This living repository will fuel the development of robust, transferable computer vision and machine learning models, enabling Mississippi to lead in open-source livestock AI model development and cross-institutional training.

AI Implementation Pathways for Small Livestock Producers
A core focus of Mississippi's AI in agriculture strategy is ensuring that innovations are accessible to small- and mid-sized operations. Through targeted Extension programming, grant-funded pilots, and field-deployable low-cost systems, producers can be equipped with user-friendly AI tools for a variety of animal management efforts including health alerts and inventory tracking. These efforts will assist our own communities while creating a replicable model for nationwide outreach.

Livestock AI Innovation Zones and Living Labs Across the State
Building on the state's land-grant mission, "AI Innovation Zones" can be established across Mississippi's distinct livestock regions. These include on-farm testing sites, Extension-led

demonstration farms, and data-rich research hubs where AI tools can be rapidly developed, validated, and refined in real-world settings. Each site can feed into a broader living lab framework, where feedback from producers directly informs algorithm refinement and tool deployment. This dynamic feedback loop accelerates adoption and ensures tools are practical, resilient, and scalable.

Opportunities and Strategies

Opportunity 1: Recommend and implement AI-driven tools for specialty and commodity crops to provide Mississippians with data-driven insights to improve decision-making, productivity, sustainability, and profitability in the areas of agriculture, and forestry.

Short-Term Strategies:

Research:
Crop monitoring. MSU researchers can deploy sensors—including soil moisture probes, drones, and satellite receivers at experiment stations to gather real-time data on plant health, soil conditions, and weather patterns. This data will be used to train AI models that will provide actionable insights to improve decisions on irrigation, fertilization, and overall crop input management.

Pest and disease control. Drone footage and field camera images can be compiled into large-scale image databases. These datasets can be used to train foundational models capable of detecting early signs of forest stress, crop stress and disease. Controlled field plots can be established to test and refine the detection accuracy of these models before full-scale use.

Harvesting automation. MSU can design and develop autonomous ground vehicles equipped with cameras and GPS. These AI-guided machines can identify crops ready to be harvested through visual recognition and sensor data (temperature, moisture levels, etc.).

Teaching:

Crop monitoring. Improving and devoting additional resources in sensor technologies, AI data modeling, and remote monitoring systems to track crop growth and field conditions. Teach students to use predictive models for analyzing soil health, weather patterns, and crop yield forecasts. Integrate field labs where students calibrate and deploy soil moisture sensors, drones, and satellite-based data collection tools.

Pest and disease control. Teach students how to develop and refine machine learning models for early detection of crop stress and disease symptoms. Integrate GIS technology and image classification techniques into coursework to enable students to map and analyze pest outbreaks and disease spread across agricultural fields. Support student-led research using drone imagery and data sets to build and test AI-driven pest detection systems.

Extension:

MSU faculty and specialists can organize on-site demonstration events so that farmers can interact with AI-powered sensors, drones, and dashboards. These events allow participants to see first-hand how real-time soil moisture, crop health, and weather data can be used to guide decisions on irrigation, fertilization, and planting schedules. Extension agents can offer hands-on workshops focused on AI tools for crop monitoring. These sessions can include live demonstrations of drone imaging and apps for field scouting for educational outreach efforts. Extension agents will offer one-on-one guidance to farmers on installing and configuring Internet of Things (IoT) devices (e.g., soil sensors, weather stations). Support will also include training in data logging, interpretation,

and integrating sensor output into AI-based platforms for actionable insights. Simulation training can be used during in-person workshops for harvesting scenarios using Mississippi crop data, helping producers understand how to calibrate machinery and adjust settings based on crop type and maturity levels.
Additional short-term strategy:

Strengthen Workforce Development through Early Engagement

- Launch outreach programs like AI camps to reach high school students early.
- Build a strong pipeline of skilled, technology-ready graduates.
- Prepare Mississippi's future workforce to meet agricultural and technical industry needs.

  Offer summer AI boot camps and virtual simulations for high school students in rural areas.

  Offer small AI project competitions judged by MSU faculty. Scholarships will be offered to camp attendees who pursue MSU STEM degrees.

Align Educational Scholarships with State Workforce Needs

- Create targeted scholarships for students pursuing AI, agriculture, and related fields.
- Help Mississippi State University attract and retain top talent.
- Support the state's long-term goal of building a highly skilled, competitive workforce.

Long-term strategies

Research: Crop monitoring and management

Create statewide, AI-powered crops and weather monitoring platforms.

How: Merge satellite, drone, and sensor network data into a central AI system that monitors all major crops in real-time. Predictive analytics will guide planting decisions, alert users to climate risks, and forecast yield. This platform will be cloud-based and integrated with farmers' mobile devices.

Who: Multidisciplinary teams from MSU's AI, meteorology, and agronomy departments. Partner with the Mississippi Department of Agriculture.

Research: Pest and disease control

Develop AI models that combine weather trends and historical crop health data for outbreak prediction.

How: Use deep learning models trained on multi-year state-wide data. Deploy these via an interactive dashboard that allows users to input their location and crop type for localized predictions.

Who: MSU data scientists, computer scientists, and plant pathologists. USDA extension specialists may assist with deployment.

Research: Harvesting automation

Create robust AI systems to optimize harvest timing.

How: MSU will develop AI algorithms that analyze imagery, climate, and soil data to determine the ideal harvest window. Systems will interface with autonomous harvesters to trigger actions automatically.

Who: Joint project between Data Science and Mechanical Engineering departments, with support from agricultural economists to evaluate cost-benefit outcomes.

Teaching: All Areas

Institutionalize AI in agriculture education.

How: Establish micro-credential and certificate programs for undergraduate and graduate-level. Develop online, hybrid, and in-person versions for scalability.

Who: Instructional designers, department heads, and Extension agents will build the curriculum. The courses will be integrated into MSU Online and promoted through Extension.

Extension: ALL Areas

Deliver AI tools and knowledge to Mississippi farmers.

How: Set up mobile training labs and AI demonstration trailers that travel to counties with limited MSU presence. Promote AI use through ExtensionBot, virtual assistants, and AI support helplines.

Who: Coordinated by MSU Extension Service and partner agencies Natural Resources Conservation Service (NRCS).

Opportunity 2: Advance the adoption of AI technologies to enhance the efficiency, sustainability, and profitability of animal production systems.

Short-Term Strategies:

Research:
Animal health monitoring. By integrating AI tools, animal health monitoring can become precise and proactive. By implementing sensor systems such as thermal cameras, producers can track vital health indicators like temperature, heart rate, and activity levels. These tools can allow for the early detection of distress or disease. Predictive analytics can be used to generate real-time alerts by analyzing data trends to help initiate care earlier. Decision support tools will help veterinarians come up with personalized treatment plans by looking at an animal's history and current symptoms, making it easier to provide consistent, informed care. MSU researchers can build AI models that help predict disease outbreaks, check for biosecurity risks, and suggest ways to improve how farms are set up to prevent problems. These tools can help plan out vaccine schedules and preventive care, all based on input from veterinarians.

Research:
Precision feeding. AI-powered precision feeding can make a difference in how farmers manage animal nutrition. Smart feeders can recognize each animal and adjust their feed based on characteristics like age, health, and overall performance. These systems can track data like how much an animal eats, how much it weighs, and how much milk or meat it's producing, then use that information to adjust the type and amount of feed. AI can also learn from past feeding records, weather patterns, and production results to fine-tune feed mixes that cut down on waste while promoting animal growth. These models can predict things like growth rates or milk output, which helps farmers plan for sales or processing.

Research:
Behavioral analysis AI tools can be used to detect early behavioral changes that indicate health problems or stress. With cameras and motion sensors in place, researchers and farmers can track things like how much animals are walking around, how often they eat, how long they rest, and how they interact with each other. AI can look at all the data and detect something out of the ordinary, such as signs of lameness, a drop-in activity, or animals keeping to themselves. These could be early warnings of a problem. For reproduction, video tools will help spot behaviors like pacing or mounting, which can help pinpoint the best time for breeding. These systems can also be used for teaching purposes, giving students and producers a clear view of animal behavior in real-time. Behavioral data can be combined with health and performance information to build smarter prediction tools. This can allow farmers to identify problems early and be proactive before a larger issue arises.

Teaching:
Animal health monitoring. MSU can develop hands-on courses that teach students how to use tools like smart sensors, health monitoring software, and dashboards for early detection of illness or injury in livestock. Students can work on real-world projects, such as building AI models that can analyze body temperature trends, heart rate, or movement to identify early signs of health issues. Workshops at MSU can give students and producers the chance to try new tools in a practical setting, helping bridge the gap between classroom learning and real-life application.

Teaching:
Precision feeding. MSU can help students understand how AI is used to make animal nutrition more efficient and tailored. Students can learn how smart feeders work to adjust feed amounts for each animal based on its weight, health, and growth stage. Projects in the course can give students the opportunity to explore how to build or improve models that recommend the best feed combinations while cutting down on waste. MSU can help students work with real data to test how these feeding systems perform in different livestock setups. Field workshops can let students see how automated feeding systems are installed, managed, and monitored in barns.

Teaching:
Behavioral analysis. MSU faculty can introduce students to AI tools that monitor animal movement, social interaction, and behavior patterns. Students can learn how to use video analysis and sensor data to detect when animals show signs of stress, illness, or changes in behavior that could impact production. As part of student-led research, learners could design algorithms that analyze walking patterns or feeding frequency and test their models' using livestock at MSU.

Extension:
MSU Extension can help bring AI tools directly to farmers and livestock producers through hands-on, interactive workshops. These field days/Ag-tech days can demonstrate how AI can be used to improve animal health, improve how animals are fed, and make better day-to-day decisions in livestock operations. Farmers can see examples of AI in action and learn how these tools can save time and increase efficiency on the farm.
MSU faculty and specialists can create short online training modules that producers can complete at their own pace. These modules can cover topics such as: How AI is being used in animal science and veterinary care, what kinds of careers are emerging in AI-related fields, and where people can go to find more educational and training opportunities. Whether someone is looking to get started with basic tools or thinking about a career, these modules can serve as a guide.
Extension agents can provide one-on-one support to help producers install and manage sensors for tracking animal health and feed intake, for example. Demonstrations can show producers how to collect and use the data to make better decisions.

Strengthen Workforce Development through Early Engagement

- Launch outreach programs like AI camps to reach high school students early.
- Build a strong pipeline of skilled, technology-ready graduates.
- Prepare Mississippi's future workforce to meet agricultural and technical industry needs.
- Engage K-12 and high school students through AI-focused outreach.
- Host AI education camps with modules on animal health AI, simulations using virtual livestock models, and career panels. Create hands-on activities like building health detection prototypes with Arduino kits.

Align Educational Scholarships with State Workforce Needs

- Create targeted scholarships for students pursuing AI, agriculture, and related fields. The Undergraduate Data Science program has a concentration in Computational Agriculture and Natural Resources that is jointly administered by data science, CALS, and CFR.
- Help Mississippi State University attract and retain top talent, (i.e. an endowed professor in Agriculture and AI).
- Support the state's long-term goal of building a highly skilled, competitive workforce.

Long-Term Strategies:

Develop AI models that can adapt to a variety of farms and livestock that is customizable for farm size.
Encourage farms, researchers, and stakeholders to share data. The more data AI has, the better outcomes will be received.

Opportunity 3: Use AI-generated technology to support sustainable management, conservation, and economic growth in Mississippi's forestry, wildlife, and natural resources.

Short-term Strategies:

Research:
Forest monitoring. MSU can expand the use of tools like MS ForestEye, which uses satellite imagery to map forest species, track biomass, and assess forest health. MSU Researchers can work on creating digital twins or virtual models of real forests that can simulate how trees grow, how fire spreads, and how different management strategies might impact key outcomes. AI-powered systems are being developed to detect early signs of pests or diseases in satellite/drone images, that can help foresters take quick action before problems spread. MSU can integrate AI with drone surveys and citizen-science data to track wildlife populations over time and can explore how computer vision can help identify wood species and monitor timber quality.

Sustainable forestry logistics. MSU can develop AI models to improve how harvested timber is moved through the supply chain. These systems can help identify the best routes for hauling logs in a way that saves time, reduces fuel costs, and lowers environmental footprint. AI models can also help with smart reforestation by suggesting where to plant trees, what species to use, and how to manage planting to increase forest resilience. Tools can be tested to adjust when and where to harvest trees based on their size, species, and density. MSU can explore generative AI models that can identify, age, and even determine the sex of wildlife using data from camera surveys. These tools can help manage wildlife populations more effectively, including reducing crop and forest damage from overpopulation.

Carbon and conservation analysis. MSU researchers can create AI models to estimate how much carbon is being absorbed by different parts of the forest. This work can support climate initiatives and give landowners the information they need to take part in growing carbon credit programs. Other AI systems could predict where soil erosion might happen, using data like land slope, soil type, and rainfall. This can help guide better land use decisions and infrastructure planning. Early wildfire detection tools are being developed using satellite imagery and thermal sensors, giving foresters more time to respond before fires get out of control.

Teaching:
Forest monitoring. MSU faculty can develop training programs and micro-credentials that teach natural resource managers how to work with AI-based platforms like ForestEye. These programs can demonstrate how to interpret satellite data, spot signs of forest stress, and use remote sensing tools in the field. Hands-on learning is an important part of the approach—Ag-Tech Days and demonstration events/workshops can allow students and landowners to try out AI tools and ask questions in a real-world setting.

Sustainable forestry logistics. MSU faculty can provide training sessions that walk through the use of AI for harvest planning, route optimization, and reforestation strategies. These sessions could be designed to be practical, where others learn how to use digital dashboards, interpret AI-generated insights, and apply them to their land or operations. The training can include everything from how to read forest growth simulations to understanding how wildlife data can be used to protect both animals and crops.

Carbon and conservation analysis. MSU faculty can provide learning opportunities on how to use AI tools for tracking carbon storage, predicting erosion, and managing wildfire risks. These programs can be useful for students, landowners, forestry professionals, and local governments interested in improving land stewardship. By combining online learning with in-person demonstrations, MSU can help Mississippians gain the skills needed to use AI responsibly and effectively for conservation and climate resilience.

Extension:
An AI tool that can be used is the ExtensionBot. It is an AI-powered web assistant built on large language models (LLMs). This tool can share up-to-date knowledge and best practices in forest, wildlife, and fisheries management, making it easier for landowners, educators, and professionals to get the information they need, right when they need it. To spark interest in AI among younger audiences, Extension can offer workshops for K–12 students and teachers that explore deep learning tools in a fun and hands-on way. MSU Extension can offer virtual meetings and hands-on training programs that show how drone technologies can be used for monitoring forests and wildlife. These sessions can take participants through the basics of drone flight, image collection, and AI-based analysis, helping landowners and professionals apply these tools to track animal populations, assess habitat health, or even spot signs of disease or damage in the landscape.

Additional short-term strategy:

Strengthen Workforce Development through Early Engagement

- Launch outreach programs like AI camps to reach high school students early.
- Build a strong pipeline of skilled, technology-ready graduates.
- Prepare Mississippi's future workforce to meet agricultural and technical industry needs.
- Create AI camps and K-12 STEM programs focusing on biodiversity monitoring, climate change impacts, and drone technology for forest mapping. Camps will use gamified platforms and classroom-friendly AI tools like Google Teachable Machine.

Align Educational Scholarships with State Workforce Needs

- Create targeted scholarships for students pursuing AI, agriculture, and related fields.
- Help Mississippi State University attract and retain top talent.
- Support the state's long-term goal of building a highly skilled, competitive workforce.

Long-Term Strategies

Use AI with satellites, drones, and sensors to keep a close eye on tree health, spot diseases and pests early, and track wildlife. Build virtual forest models to test how fires or management plans might affect the landscape.

Collaboration and Partnerships

The success of Mississippi's AI-driven agriculture and forestry initiatives depends on strategic collaboration with a broad range of partners. Key collaborators include electrical power companies, which can help address rural infrastructure challenges, and educational institutions such as 4-H, FFA, Career and Technical Education programs, and community colleges that serve as vital pipelines for workforce development. Partnerships with industry leaders like John Deere, Case, the Forestry Commission, and the American Veterinary Medical Association will support innovation, tool adoption, and training. In addition, aligning with federal agencies will open avenues for funding and support of transformative AI projects on a scale.

Workforce Development and Education

Building a skilled workforce is essential for successful AI integration in agriculture, forestry, and animal systems. Extension programs will play a central role in delivering AI training through workshops, certification courses, and hands-on demonstrations. Educational curricula will be developed to ensure students gain practical experience applying AI to real-world scenarios in crop production, livestock care, and forestry management. Programs like FFA and 4-H will incorporate AI concepts to inspire interest and readiness for careers in agricultural technology. Through direct engagement and applied learning, these initiatives will help build a tech-savvy workforce ready to meet the challenges of tomorrow.

Research and Innovation

A unique example of innovation in workforce training involves the integration of AI into FFA and 4-H programming. Using an AI-powered platform originally designed for veterinary education, youth participants can simulate the diagnosis and treatment of common animal diseases managed in rural practices. This immersive experience, hosted on the Easy Generator® platform used by MSU's College of Veterinary Medicine, enhances learning while exposing students to real-world applications of AI in veterinary and animal science fields. This hands-on, simulation-based approach supports both workforce development and early STEM engagement.

Policy Recommendations

Strengthen workforce development by prioritizing programs that support workforce development initiatives by engaging youth early. These outreach efforts could be through AI camps for high school students. Initiatives like this could help build a pipeline of skilled, technology-ready youth who could meet the demands of artificial intelligence in Mississippi.

Potential scholarship programs aimed at students pursuing AI related degrees, agriculture, and other related disciplines. This would aid in MSU attracting top talent but also align with the state's long-term workforce development goals.

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