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Hearing of the Subcommittee on Conservation, Research, and Biotechnology,  
U.S. House Ag Committee  
“A Review of Title VII: University Perspectives on Research and Extension Programs”  
June 14, 2023

Good morning, **Chairman Baird, Ranking Member Spanberger** and Members of the Subcommittee. I am Dr. Bernie Engel, Senior Associate Dean and Director of Agricultural Research and Graduate Education and Dean elect of the College of Agriculture at Purdue University, where I am also a professor in the Department of Agricultural and Biological Engineering. I also serve as the director of the Purdue Agricultural Experiment Station. I am pleased to be here today to offer testimony on behalf of the College of Agriculture at Purdue University, a top 5 globally ranked college of agriculture and forestry.

On a personal note, I want to share that I was a member of the first class of the U.S. Department of Agriculture (USDA) National Needs Fellowship, a program run by National Institute Food and Agriculture (NIFA) and authorized through the Farm Bill. I believe if not for that program, I would not have pursued the career path I did. I was finishing my MS Agricultural Engineering degree when this program awarded the inaugural round of fellowships with highly competitive stipend rates. I was contacted and encouraged by faculty from multiple land grant colleges of agriculture to explore the opportunity and ultimately pursued and completed my PhD at Purdue University in use of artificial intelligence in hydrologic/water quality modeling. I share that experience as an example of how federal investment in research can have a ripple effect as I sit before you now in part because of that fellowship program.

Thank you for hosting this hearing to learn more about how universities utilize the research and extension programs that are at the foundation of the Farm Bill. Continued support of the core programs that fortify our nation’s research, Extension and education system serving U.S. food, agriculture and forestry systems is needed. Our community of researchers, extension specialists and educators make an impact at every level of our society today while addressing the big challenges of tomorrow.

As we look to the next farm bill, we must continue to prioritize a strong investment in both agricultural research and extension. Public colleges of agriculture, including Purdue University and other land-grant universities, foster excellence in research innovation while training future leaders in agriculture, natural resource and food systems. Public research accelerates technology adoption, growth of the agricultural and food marketplace, entrepreneurship, and public-private partnerships, returning \$20 to the economy for every dollar spent. In recent years, we have seen other countries, including China, India and Brazil, rapidly expand investment in public agricultural research which threatens U.S. competitiveness globally.

We support the policy recommendations put forth by the Association of Public & Land-Grant Universities (APLU) Board on Agriculture Assembly regarding Title VII, the Research Title, of

the upcoming Farm Bill. USDA's NIFA is a critical partner of land-grant institutions and provides important support through the programs within Title VII. While APLU's recommendations are many, I would like to highlight three areas – capacity funds, competitive funds and infrastructure – that directly impact Purdue University and the work of our researchers, educators and Extension specialists.

NIFA provides legislatively authorized capacity funds – which are matched at state and local levels – that allow our universities, including state agricultural experiment stations, to perform agricultural research and extension programs that benefit U.S. agriculture and rural prosperity. NIFA's competitive funds allow for our researchers and extension specialists to address the grand challenges affecting our nation and world while training the next generation of agricultural scientists. I would like to give some specific examples of how Purdue University is making an impact through both capacity and competitive programs.

### **Capacity Funds**

Capacity funds allow our institutions to have the right people and capabilities in place to respond quickly to local and regional issues while also sustaining long-term research programs. These funds also promote the creation of multistate and multi-institutional collaborations to form regional and national research and extension systems to address more complex, multi-dimensional challenges. For Purdue, the majority of these funds come from the **Hatch, Smith-Lever and McIntire-Stennis Acts**. Let me give you some examples from each of these.

The **Hatch Act of 1887** supports the capacity of 1862 land-grant universities, including Purdue University, to perform agricultural research in university departments and at state agricultural experiment stations.

- Purdue uses capacity funding, including **Hatch and Smith-Lever**, to support an Extension Plant Pathology scientist and the Purdue Plant and Pest Diagnostic Lab. Both are critical when it comes to identifying, tracking and managing new plant diseases and pests that move into Indiana. In 2018, the lab identified the first instance of tar spot in Indiana corn fields. With resources in place, Purdue researchers and Extension specialists were able to quickly identify and work on management options. This also set Purdue up to lead regional efforts to track and manage the progression of tar spot across the north central states. Today, Dr. Darcy Telenko, Purdue's Extension plant pathologist, has more than 100 scouting and research plots, including at the Purdue Agricultural Centers, across the state to monitor crop disease pressures and is working with county Extension educators through the Purdue On-the-Farm Program to submit data from corn and soybean fields, including disease issues. Dr. Telenko is a great example of a federally-supported applied research program that quickly translates research and gets it into the hands of the stakeholders who need it.
- The **Hatch Multi-State Research Fund** is another critical tool 1862 Land-Grant institutions have to conduct research to solve problems that concern more than one state. This program encourages partnership, collaboration and coordination across land-grants, as well as with federal scientists, state agencies and others, and leverages funding dollars to create impacts and outcomes greater than what individual institutions can accomplish

on their own. Purdue researchers are involved in 93 multi-state projects, including one that looks at soybean diseases in the north-central region and beyond.

- Reducing the use of antibiotics in livestock production is an important area of research across land-grant universities. Researchers at Purdue are working on this challenge in a variety of ways, including looking at how gut health impacts the overall well-being of animals. Animal sciences researchers, supported in part by capacity funds, are working to find out what is happening at the gut level in pigs to help solve problems like efficiency, waste and overall health of the animals. Another example is work being done in Purdue's agricultural and biological engineering department to develop sensor-based technology to rapidly detect disease, including specific bacteria present, in livestock on the farm instead of sending samples to a lab. This would allow producers to quickly treat sick animals with the correct antibiotics for the bacteria present which can save animals and reduce unnecessary antibiotic usage.

The **Smith-Lever Act** authorizes the Cooperative Extension System and supports agricultural extension at 1862 land-grant universities. Extension links the research performed at public land-grant universities to its application in local communities and well beyond with today's communications technologies. This capacity funding allows Extension to provide a variety of reliable services to both rural and urban communities, including nutrition education, community planning, youth education and farm safety programs, to name just a few.

- Our Extension specialists and educators also use the **Expanded Food Nutrition Education Program (EFNEP)** to provide nutrition education programming to low-income families to help them develop healthy nutrition and physical activity habits. The nutrition education programs delivered through Purdue Extension funded by SNAP-Ed and EFNEP are increasing access to fruits and vegetables in limited resource neighborhoods in Indiana through multi-level intervention and community health approaches. In FY22 we partnered with 58 organizations statewide to grow, donate, and distribute over 60,000 servings of produce.
- In urban settings like Gary, Indiana there is demand for fresh fruits and vegetables and space for urban farming to occur but very few urban farms in the city. Through applied research and extension supported by the **Sustainable Agriculture Research and Education (SARE) program**, Purdue increased opportunities for effective and sustainable training, learning and networking to build and sustain local growers to develop a sustainable and resilient food system.
- To remain competitive, rural and small businesses need a well-designed online presence. Purdue Extension created a program to share strategies for entrepreneurs and business owners to learn how to reach more customers, how to use digital transactions, how to be discovered by potential customers, and ways to improve customer online experience. The results included increased customer engagements, customer base, and sales.
- The National Institute for Occupational Safety and Health (NIOSH) has suggested that farmers represent an occupational group with one of the highest levels of job-related stress. The Purdue Farm Stress Team is working closely with the ag industry and producers to provide resources to help manage stress on the farm. The team has also played a role in the newly formed 988 suicide and crisis hotline, including the

development of farm/rural-specific training modules for hotline operators across the country that will be rolled out in coming months.

- Purdue Extension's Work Ready curriculum teaches skills necessary to increase the number of qualified applicants for U.S. job openings. Extension educators statewide teach the Work Ready curriculum to both high school students and adults. Educators are encouraged to choose the topics that best serve their populations. The curriculum adheres to the Cooperative Extension Service's practice of teaching only research-based information in a hands-on format.
- The poultry industry identified the need for coordinated and consistent training for employees and food safety training in table egg production. In 2019, Purdue Extension developed the Shell Egg Academy with a holistic approach recognizing the food safety connection between live production houses (laying hens) and egg processing plants.

The **McIntire-Stennis Act** provides capacity funds to increase forestry research and to train future forestry scientists. Indiana has an abundance of both managed and unmanaged forests across the state, especially in our southern counties. McIntire-Stennis funds have allowed Purdue to hire top-notch scientists and Extension specialists to not only provide practical resources to forest landowners but to also develop and apply advancements in digital technology to manage forest resources.

- Purdue is a leader in **Digital Forestry** research. Building on a strategic investment by the university and McIntire-Stennis capacity funding, Purdue researchers have secured significant federal funding through the **USDA NIFA Sustainable Agricultural Systems (SAS)** and **USDA Climate Smart Commodities program** to help landowners adopt information from digital technologies to better manage their forests. The Center for Digital Forestry at Purdue University is working towards developing unmanned aerial platforms, backpack-based systems, ground based vehicle platforms, and strategies that leverage digital technology to measure, monitor and manage urban and rural forests to maximize social, economic and ecological benefits. The technology has demonstrated the potential to move from characterizing a low percentage of trees in a typical forest management unit to characterizing every tree in the unit with an ultimate goal of characterizing every tree on the planet.

### **Competitive Programs**

The **Agriculture and Food Research Initiative (AFRI)** is the flagship competitive grants program through USDA's National NIFA. AFRI grants fund research, education and extension programs that address national challenges in agriculture and food systems. I want to thank the Committee for its continued support of AFRI and encourage its **re-authorization at the \$700 million level**.

I believe one of Purdue's strengths is the strong emphasis with regards to collaborations not only across disciplines within the College of Agriculture but also across the university, with other research institutions, as well as with industry. This emphasis has allowed our researchers to be extremely competitive in receiving funding from a variety of AFRI programs.

- Our researchers have been particularly successful in the **AFRI Sustainable Ag Systems (SAS) grants** program which focuses on making transformational changes in the country's food and agriculture system. We currently have faculty who are lead investigators on three multi-year SAS grants each totaling \$10 Million to address subjects including building diverse ag systems in the Corn Belt, increasing seafood production through aquaponics, and improving forest health through digital technologies.
- The **Specialty Crop Research Initiative (SCRI)** supports research on fruits and vegetables with a goal to make these crops easier to manage and less expensive to grow. We support the **reauthorization of SCRI and removal of the matching requirement** which is a hindrance in many situations. Purdue researchers, with collaborators from University of Illinois and University of New Hampshire, are using SCRI funding to help small farmers in both urban and rural settings better understand pest pressures when using high tunnels to raise produce. The four-year project will lead to integrated pest management and crop management recommendations, as well as an online tool to help growers improve yields and profits and to improve food security for local communities across the U.S.
- Purdue animal science researchers are exploring how to maximize well-being for hens in cage-free conditions through a NIFA competitive grant. They are developing computer simulation models to better understand what environments hens prefer and then will build out the environments to test the reaction of the hens. The goal is to maximize comfort and well-being for the hens while meeting the goals of the producer.
- Our researchers are also at the forefront of using biotechnology to make important advances in both plant and animal agriculture. Jianxin Ma, a leader in soybean genomics and researcher at Purdue, is modifying soybeans using leading-edge techniques to increase the number of nodules, which fix nitrogen, on soybean roots. His basic genomic research is leading to a substantial increase in the number of soybean pods on plants which could ultimately lead to a significant increase in yields. Because of his groundbreaking work, the Indiana Soybean Alliance – the state soybean checkoff organization funded by farmers through a small checkoff fee on soybean sales – invested in an endowed chair of soybean genetics at Purdue, which Ma fills. This commitment by Indiana soybean farmers extends the investment by USDA in an important area for not only our state but the entire U.S. soybean industry.

### **Ag Research Infrastructure Needs**

Investment in agricultural research infrastructure is needed as we look to our universities to do leading-edge research to address national needs and challenges and attract/retain top-level talent. China, India and Brazil have been investing heavily in this area and are quickly gaining on – and in some cases surpassing – the U.S. in terms of capabilities. To remain competitive, we need to strengthen our commitment to support new facilities that support both current and future research.

We recently completed a five-year master plan for a portion of Purdue's College of Agriculture research portfolio and found more than \$300 million in needs for new facilities. This is not maintenance on current infrastructure. This is new construction to create new capabilities to conduct new, innovative research. Purdue and the state of Indiana have been investing in

facilities but we cannot invest fast enough to meet all of the needs. Within the last 10 years, we have built state-of-the-art research and teaching facilities for both animal sciences and agricultural and biological engineering with support from our state government.

**Re-authorization of the Research Facilities Act and increased funding** would be a great first step in meeting some of these agricultural research infrastructure needs. We believe the inclusion of some level of cost-share requirement would increase the likelihood that universities and states are truly invested and committed longer term to support and maintain this infrastructure.

### **Looking to the Future**

The agricultural research and extension efforts – supported by programs within Title VII of the Farm Bill – that I have outlined today are ultimately about addressing today’s needs while working towards the future of our agriculture, food and natural resource systems.

We have seen the intersections of agriculture and national security during the recent global health crises that exposed significant risks to our health, food and agricultural resiliency. Land-grant institutions can play a key role as a neutral convenor of partners, including federal and state agencies, private industry and others, to address this issue. Purdue is working with Sandia National Laboratories on an effort funded by the Department of Homeland Security to create a **Health, Food and Agriculture Resiliency (HFAR) university consortium** to bring groups together to tackle this important challenge.

In conclusion, a robust federal investment in agricultural research and extension is necessary to ensure U.S. farmers remain competitive globally while strengthening our food supply chain and ensuring the resiliency of our agricultural and food systems. Continued investment in the core research and extension programs and a look toward new partnerships among federal agencies, universities and the private sector will work towards the goal of food security. This investment in a sustainable, safe and secure food and natural resource system helps guarantee our national security.

As I noted earlier, our institution supports the APLU’s policy recommendations regarding Title VII which includes re-authorization and funding of the core research, education, extension and infrastructure programs to support agricultural research and extension.

Thank you for allowing me the opportunity to provide remarks today on behalf of Purdue University, and thank for your continued support for critical agricultural research and extension programs. I am happy to answer any questions.