

Iowa State University Combined Research and Extension Plan of Work 2022-2026

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I. Plan Overview

1. Executive Summary

Agriculture in the state of Iowa has grown beyond traditional production of crops and livestock to encompass the revolution in the bioeconomy, life sciences, food sciences, value-added products, environmental sciences, and social sciences. Iowa's world-class endowment of natural resources, its highly skilled and educated people, and its well-developed infrastructure supports a diverse and dynamic set of food, feed, fiber, biofuels and bioproducts, environmental and community endeavors.

Iowa's abundance is astonishing, ranking second nationally (behind California) with cash farm receipts (2019) of \$29.29 billion. This position is the result of Iowa's strong ranking in the production of several commodities. Iowa is the nation's first- or second-largest producer of corn, soybeans, pork, eggs and ethanol, the fourth largest producer of cattle, sixth in turkey production, and 11th dairy products. Iowa had 86,104 farms operating on 30,563,878 acres in 2017. Cropland accounts for 87 percent of Iowa's total farm acres (2017). The average-sized farm in Iowa has 355 acres, while the median farm size is 142 acres (2017).

Iowa had 3,155,070 residents in 2019, ranking 31st among states in total population size. The state's nine metropolitan statistical areas (MSAs) include 21 of its 99 counties and 61 percent of its total population (2019). Iowa's 39 percent non-metropolitan population share is 9th highest among states. Slightly more than one third (36 percent) of Iowa residents live in rural territory with fewer than 2,500 inhabitants, ranking 11th among states (2019).

The Hispanic/Latino population, which includes people of any race, is the largest minority group in Iowa, accounting for 6.3 percent of the population in 2019. The Black or African American population, both Latino and non-Latino, is the second-largest minority group with 4.1 percent of residents. The Asian race group is third with 2.4 percent (2019). Iowa's non-Latino white alone population accounts for 85.1 percent of the total population (2019). The poverty rate for individuals in Iowa was 11.2 percent (+/- 0.5%) in 2019, compared to a rate of 12.3 percent (+/- 0.1%) for the United States. Minority students comprised 26.0 percent of preK-12 public school enrollment in 2020-21, compared to 9.8 percent in 2000-2001.

Continuing demographic changes, globalization and technological innovations create ongoing opportunities and challenges toward achieving socially beneficial, economically successful, and environmentally sound systems for food, feed, fiber, fuel, and other value-added products. To this end, we have identified six, long-term critical issues that our research projects and extension programs are designed to address:

- Food Production and Agricultural Systems
- Natural Resources and Environmental Stewardship
- Community and Economic Development
- Health, Nutrition and Well-being

- Human Potential and Youth Development

- Transformative Technology

Research is conducted across most disciplines in agriculture, defined in its broadest sense, from basic to applied, to make advances in feed, food, fiber, and fuel production, to help increase capacity and provide an adequate and nutritious food supply. The research expressed in the program areas is the result of cooperation among researchers within and between departments and colleges at all levels of activity.

Hatch and Smith-Lever capacity grants provide critical funding for staffing that ultimately allows us to leverage and match other external funding sources. The capacity grants also provide flexibility in programming to better meet current and emerging needs not being addressed by other sources of funding. Without these funds, there would be less applied research, less relevant application of research, and less integration of extension and research work.

2. FTE Estimates

Year	1862 Extension	1862 Research
2022	382.8	484.0
2023	382.8	484.0
2024	382.8	484.0
2025	382.8	484.0
2026	382.8	484.0

II. Merit / Peer Review Process

Iowa's rapidly changing political, social, and economic environment demands a dynamic program development process that incorporates the following:

- self-directed work teams,
- continuous needs assessment to inform program design and implementation,
- public and private partnerships,
- an increased focus on reporting outcomes,
- aggressive funding mechanisms to grow new programs,
- strong connection with multiple program partners.

Needs Assessment:

ISU Extension and Outreach will continue to follow this two-point approach:

Engagement of key statewide constituencies and the general population: Surveys, listening sessions, and an External State Advisory Committee will be used to obtain input from Iowans with a broad set of interests and perspectives. State level governmental agencies and non-governmental organizations will be involved.

Engagement of local stakeholders. County Extension Councils and local stakeholder groups will participate in formal activities to identify, confirm, prioritize, and/or regionalize local needs.

State POW merit review:

North Central Regional Program Directors will continue to provide oversight, guidance, and course corrections on the logic models and joint program implementation and evaluation. Also, program leaders monitor feedback from stakeholders in report mechanisms including departmental reviews, program evaluation by Plan of Work teams and program evaluation as part of externally funded projects, and work with team leaders to make necessary course corrections.

Scientific Peer Review:

Project Proposals: Each project proposal will be endorsed by the department chair and Associate Director of the Experiment Station. The Assoc. Director will send the proposal to peers internal to ISU (typically 3 to 4 faculty) for a thorough review of the scientific merit, linkage with the POW, and the strategic plan of the college. Depending upon the reviews, the project is either approved, modified somewhat to significantly based on review comments, or rejected. Project proposals may be submitted by individuals, small groups, or a large group but must align with one or more programs under the POW.

Program Review Teams:

Ad Hoc teams will be asked to periodically review all programs under the broad themes. The teams will be asked if the research activities, outputs and outcomes are in alignment with the POW and if there are emerging research programs that the Experiment Station should be incorporating into the POW within the five-year period.

III. Stakeholder Input

1. Actions to Seek

Building on the strong tradition of stakeholder engagement with the experiment station and cooperative extension, we will interact with traditional and nontraditional stakeholder groups through normal activities as well as inviting the public's participation in specific surveys, listening sessions, an advisory council, and focus groups.

To respond to the needs of minority and underrepresented groups, Extension will continue to increase access by hiring more bilingual staff that are representative of the target population, and continue to seek to have broader, more inclusive representation on advisory teams.

Actions taken to seek stakeholder input include:

- State advisory council with broad demographic representation
- Partnerships with agencies and organizations serving diverse communities
- Targeted invitations to traditional stakeholder groups and individuals
- Targeted invitations to non-traditional stakeholder groups and individuals
- Surveys of traditional stakeholder groups and individuals
- Surveys with non-traditional groups and individuals
- Surveys of the general public

- Surveys of selected individuals from the general public

2. Methods to Identify

The experiment station will use a variety of advisory groups, consisting of key leaders from stakeholder groups. Focus group and survey participants will be identified, using social science statistical methods. Academic program reviews provide external input to departments regarding the relevancy, innovation, and impact of their research enterprise. Thus, on a rotational basis, all seven program areas receive periodic external input.

Extension and Outreach collects inputs annually and ongoing by a variety of means. Over a five year period it will use statewide listening sessions, a diverse advisory council, a representative survey of Iowans, participant questionnaires and other methods. At the county level, elected county Extension council officials review needs and plans on an annual basis, involving citizens using a variety of formal and informal processes to assure broad representation reflecting local populations. In addition, Extension is developing and testing a new Shared Database that will enable all Extension personnel to repost Civil Rights data after each program conducted. The database will offer real-time data regarding efforts with untapped audiences. Extension leadership is currently funding research to better understand how to access and communicate with untapped populations statewide. This will allow Extension to be better prepared to serve all Iowans.

3. Methods to Collect

- Schedule meetings with traditional stakeholder groups and individuals.
 - Provide activities specifically for non-traditional groups and individuals, in order to identify community leaders to engage and collect input.
 - Provide community listening sessions.
 - Conduct targeted and random surveys, including web surveys, mailed surveys, and in-person surveys.
 - Record input received during regular contacts by field specialists, regional directors, county staff, and state specialists who work with individual private sector partners.
 - Hold meetings with agencies, professional associations and advisory boards, and other various groups across the state.
 - Ask stakeholders to serve on advisory boards, leadership councils and work teams to help set program direction
 - Develop innovative programs to reach new audiences, and implement strategies to reach desired outcomes.
 - Provide webcasts to share information and new policy direction, and receive input from stakeholders.
 - Survey participants at the beginning and end of each training, to assess their training needs and determine how the training series can be improved.
 - Utilize self-assessments at the beginning and end of each training to identify specific knowledge and skills participants gained from the training, i.e., effectiveness of the training.
 - Conduct follow-up surveys after selected trainings.
 - ISU Extension and Outreach state and field specialists will serve on multiple county and state advisory committees.
 - Survey participants at public meetings and follow-up with selected individuals.
 - Collect input through discussions and e-mails with Advisory Board members.
- ## **4. How Considered**
- In the budget process

- To identify emerging issues
- To redirect and plan extension programs
- To redirect and plan research programs
- In the staff hiring process
- In our action plans
- To set research and extension priorities
- To focus programs on local needs and citizen priorities
- To measure/verify program impact

IV. Critical Issues

1 Food Production and Agricultural Systems

Description:

Agricultural production and related up and down stream industries make up the single largest sector of Iowa's economy and is important to rural communities in the state. Technology development via scientific discovery, both basic and applied, is needed to improve the efficiency, safety and sustainability of food production. Adoption of new technologies and practices by farmers holds economic, environmental and social implications at the farm, community and market levels. Production, marketing and business skills are needed by farmers to effectively evaluate new opportunities and navigate emerging challenges. Iowa's changing climate, especially increased amounts of rainfall during rain events, also requires multi-disciplinary research to solve related agricultural problems. Our research, education, and extension will continue to provide a safe, sustainable, accessible, and affordable food supply for Iowa, the nation, and the world. Examples of research and extension project/program focuses within this critical issue include commercial agriculture production efficiencies and productivity; cropping systems research; meat sciences; improvements in animal nutrition; commercial food safety, security, and production; regional and local food production; production animal systems; and integrated pest management.

Term: Long

Science Emphasis Areas

Agroclimate Science

Food Safety

Sustainable Agricultural Production Systems

2 Natural Resources and Environmental Stewardship

Description:

Wise management of all natural resources, including water, soil, air, and other resources is needed to sustain our nation's ability to produce food, feed, fiber, and bioproducts/biofuels as well as support environmental goods and services and economic and social functions. Without attention to environmental goods and services, our quality of life would be greatly impacted. The focus areas of this program encompass all of the natural resources within the highly human modified agroecosystem. Proper stewardship of natural resources that provide the base inputs for modern agricultural production is foundational to sustaining the desired quantity and quality of food, feed, fiber, and biofuels and the natural environment. Research projects and extension programs under this critical issue are designed to advance the sustainability and conservation of air, water, soil, plant, minerals, and biodiversity in Iowa's agricultural, forest, and forage/grassland production systems. Examples of research and extension project/program focuses, which address this critical issue, include nutrient reduction strategies, adoption of best management and conservation practices, master conservation courses, manure application, and nitrogen use efficiency.

Term: Long

Science Emphasis Areas

Agroclimate Science
Bioeconomy, Bioenergy, and Bioproducts
Environmental Systems
Sustainable Agricultural Production Systems

3 Community and Economic Development

Description:

Economic issues facing Iowa communities are numerous and include an aging workforce, influx of immigrants, and changing economic structures. A combination of factors such as aging infrastructure, including housing; resistance to additional taxation; depopulation; and lower population density are pushing small local governments' budgets to their limits. Severe storm and flood damage, a problem that has been increasing in recent years, exacerbates economic issues in communities of all sizes. All local governments face shrinking budgets and need strategies and tools for doing more with less. Life in Iowa's small and large communities are affected by global issues such as the price of fossil fuels and instability in the global economy. Our research, education, and extension will continue to enhance the economic health of communities, grow community leadership and civic engagement, and improve the quality of life for all Iowans. Examples of research and extension project/program focuses within this critical issue include economic modeling, workforce development, college and career readiness, company growth and productivity, housing assessments, community sustainability, community health, community and regional planning, community leadership development, civic engagement, industrial design, farm business management, diffusion of innovation, farm transition and beginning farmers, and farming risk management.

Term: Long

Science Emphasis Areas

Family & Consumer Sciences

4 Health, Nutrition and Well-being

Description:

The percentages of Iowa children, youth and adults who are overweight/obese are 32%, 28% and 64%, respectively. Of Iowa's 21 "completely rural" counties, almost half have health outcomes indicating poorer health of those residents. Regular physical activity is important to an individual's health, sense of well-being, management of stress and maintenance of a healthy body weight. 83% of adult Iowans do not meet recommended physical activity guidelines. Health can also be compromised by a foodborne illness (FBI), which can be caused by improper food handling or storage at home and, in some cases, long-term complications or even death can result. Costs of FBI for medical expenses and due to lost productivity can cause hardship to families. Health, nutrition and well-being science areas include personal wellness, food science, human nutrition, and kinesiology to maintain and advance the overall health of Iowans. Examples of research and extension projects/programs addressing this critical issue include dietary guidance; proper handling, preparation, storage, and preservation of food at home; physical fitness; mental health; stress management; financial health; caregiving; parenting; and prevention sciences, including such topics as opioid/substance abuse prevention.

Term: Long

Science Emphasis Areas

Education and Multicultural Alliances
Family & Consumer Sciences
Food Safety
Human Nutrition
Youth Development

5 Human Potential and Youth Development

Description:

Iowa is changing, with an increase in older adults and increased ethnic, racial, and socioeconomic diversity. Iowans support working collaboratively with local, state, and federal partners to impact public issues such as poverty; financial instability; mental health stress management; support for older adults; quality of family relationships; and child and youth success academically, socially, and emotionally. Our research, education, and extension projects and programs will help families across socioeconomic status, ethnicity, and race to increase knowledge and develop skills to improve decision making related to caring for children and other family members; parenting effectively; helping children and youth succeed academically, socially, emotionally, and in career readiness; supporting older adults; adopting less risky behaviors and lifestyle choices; and managing and maximizing financial resources.

Term: Long

Science Emphasis Areas

Education and Multicultural Alliances
Family & Consumer Sciences
Youth Development

6 Transformative Technology

Description:

Innovations in analytics and technologies, such as digital agriculture (the use of data to make more informed decisions about managing agronomic operations), big data, and genetic/phenomic advances in animal and plant science, hold the promise of helping to feed and nourish a growing world population. Barriers remain to achieving this goal, however. We must accelerate the pace of digital innovations and remove barriers to accessing them. Farmers (big and small) must be prepared to adapt and embrace additional change in order to take full advantage of these tools in the years ahead. Agricultural colleges play a key role in research, discovery and diffusion of innovation in this area. Research and extension programs/projects addressing this critical issue support the discovery and adoption of technologies that connect Iowans with solutions to current and emerging challenges. A few examples of program/project focuses within this critical issue include agricultural and biosystems engineering to develop biological sensors for monitoring agricultural animals and/or drones and other robotics for crop monitoring and data management; genetics and phenomics – the measurement of physical and biochemical traits of organisms as they change in response to genetic mutation and environmental influences; and assessing the economic and technological needs of agricultural producers—of all operational sizes—struggling to adopt new innovations.

Term: Long

Science Emphasis Areas

Agroclimate Science
Environmental Systems
Sustainable Agricultural Production Systems