REQUEST FOR APPLICATIONS

Agriculture and Food Research Initiative Competitive Grants Program Foundational and Applied Science Program

MODIFICATION: This RFA is an updated version of the FY 2021-FY 2022 solicitation. It includes only the references to the FY 2022 review cycle; FY 2021 references have been eliminated. Additional edits to pages 6, 13, 14, 20, 27, 57, 63, 81, 95, 97-100, 106-109, 111, 122, 123, and 127.

FUNDING YEAR:	Fiscal Year 2022
APPLICATION DEADLINE:	Varies by Program Area (see *Part I § C*)
ANTICIPATED FUNDING:	$300,000,000
FUNDING OPPORTUNITY NUMBER:	USDA-NIFA-AFRI-009003
ASSISTANCE LISTING NUMBER:	10.310
LETTER OF INTENT DEADLINE:	Varies by Program Area (see *Part I § C*)

INITIAL ANNOUNCEMENT

National Institute of Food and Agriculture
United States Department of Agriculture

Assistance Listing: The AFRI Foundational and Applied Science RFA is listed in the Assistance Listings under number 10.310.

Table 1: Key Dates and Deadlines

Task Description	Deadline
Application:	5:00 P.M. Eastern, on the 2022 deadline dates indicated in *Part I § C*
Letter of Intent:	If applicable, 5:00 P.M. Eastern, on the LOI deadline dates indicated in *Part I § C*
Applicants Comments:	Within six months from the issuance of this notice (*NIFA may not consider comments received after the sixth month*)

Advancing Diversity, Equity, Inclusion, and Accessibility. NIFA recognizes research, education, and extension efforts will have the greatest impacts when equity is grounded in the programs. NIFA is committed to enhancing diversity, equity, inclusion, and accessibility of programs and encourages individuals, institutions, and organizations from underserved communities to apply to funding opportunities as lead, co-lead, or subaward recipient(s), and to engage as leaders in the peer panel review process to support the development of strong networks and collaborations. NIFA encourages applications that engage diverse communities and have broad impacts through research, education, extension, and integrated activities to address current and future challenges.

Stakeholder Input. The National Institute of Food and Agriculture (NIFA) seeks comments on all request for applications (RFAs) so it can deliver programs efficiently, effectively, with integrity, and with a focus on customer service. NIFA considers comments, to the extent possible when developing RFAs and use comments to help meet the requirements of Section 103(c)(2) of the Agricultural Research, Extension, and Education Reform Act of 1998 (7 U.S.C. 7613(c)(2)). Applicants may submit written comments to Policy@usda.gov (email is for comments only). Please use the following subject line: Response to the AFRI Foundational and Applied Science RFA.

Centers of Excellence. Applicants are encouraged to visit the NIFA's Centers of Excellence (COE) for information on COE designation process, including COE criteria, and a list of programs offering COE opportunities. A recording of COE outreach and COE implementation webinars are also available.

Commodity Board Co-Funding Topics. NIFA solicits proposed topics for Agriculture and Food Research Initiative (AFRI) RFAs from eligible state and national commodity boards on an ongoing basis. Topics must relate to the established AFRI six priority areas. Topics submitted by the commodity boards that align with NIFA priorities are chosen for inclusion in selected

program areas of AFRI RFAs. Details on general information and topic submission resources for inclusion in future AFRI RFAs can be found at NIFA's Commodity Board Provision website.

Applicants are encouraged to view AFRI Commodity Board Co-funding Topics (A1811) in *Part I § C* for additional details on commodity board-specific priorities and submission of applications relevant to these priorities.

EXECUTIVE SUMMARY

This notice identifies the objectives for AFRI Foundational and Applied Science program projects, deadlines, funding information, eligibility criteria for projects and applicants, and application forms and associated instructions.

The Agriculture and Food Research Initiative (AFRI) is America's flagship competitive grants program that provides funding for fundamental and applied research, education, and extension projects in the food and agricultural sciences. In this RFA, NIFA requests applications for six AFRI priority areas through the Foundational and Applied Science Program for 2022. The goal of this program is to invest in agricultural production research, education, and extension projects for more sustainable, productive, and economically viable plant and animal production systems. The global agricultural output needs to be expanded significantly to meet the food needs of the population expected in 2050; thus, it is imperative to develop innovative, safe, and sustainable management strategies for livestock (including poultry and aquaculture species), crops, and critical underlying resources. Applications that address climate change, nutrition security, expanding markets for producers, indigenous traditional ecological knowledge, and equity for underserved producers are encouraged. Also encouraged are applications that incorporate virtual learning options, where appropriate and practical for integrated programs.

In 2022, applications are sought in the following priority areas:

1. Plant health and production and plant products;
2. Animal health and production and animal products;
3. Food safety, nutrition, and health;
4. Bioenergy, natural resources, and environment;
5. Agriculture systems and technology; and
6. Agriculture economics and rural communities

The anticipated amount available for new grants for the 2022 deadlines in this Foundational and Applied Science RFA is approximately $300 million.

This RFA is being released prior to the passage of appropriation acts for FY 2022 and FY 2023. Enactment of additional continuing resolutions or an appropriations act may affect the availability or level of funding for this program.

This RFA solicits Standard Grants, Conference Grants, Coordinated Agricultural Project Grants, and Food and Agricultural Science Enhancement (FASE) Grants, whereas project types solicited in this RFA are Research, Extension and Integrated Research, Education and/or Extension projects. Grant types and project types solicited vary by program area priority and not all grant types are solicited within each program area priority. See *Part I § C* (Program Area Descriptions) for grant and project types solicited by each specific program area priority, and *Part II § C* for a description of each individual grant type and project type.

Table 2: Program Area Priorities and Deadlines
The deadlines under this RFA are summarized as follows:

Priority Area[1]	Program Area	2022 Review Cycle Deadlines[2]
PHPPP	1a. Foundational Knowledge of Agricultural Production Systems	September 15, 2022
PHPPP	1b. Foundational Knowledge of Plant Products	August 18, 2022
PHPPP	1c. Pests and Beneficial Species in Agricultural Production Systems	August 25, 2022
PHPPP	1d. Physiology of Agricultural Plants	October 6, 2022
PHPPP	1e. Plant Breeding for Agricultural Production	September 22, 2022
PHPPP	1f. Pollinator Health: Research and Application	August 25, 2022
PHPPP	1g. Conventional Plant Breeding for Cultivar Development	September 22, 2022
AHPAP	2a. Animal Reproduction	August 11, 2022
AHPAP	2b. Animal Nutrition, Growth and Lactation	August 11, 2022
AHPAP	2c. Welfare of Agricultural Animals	August 11, 2022
AHPAP	2d. Diseases of Agricultural Animals	August 11, 2022
AHPAP	2e. Animal Breeding, Genetics, and Genomics	August 11, 2022
FSNH	3a. Food Safety and Defense	August 25, 2022
FSNH	3b. Novel Foods and Innovative Manufacturing Technologies	September 1, 2022
FSNH	3c. Diet, Nutrition, and the Prevention of Chronic Diseases	August 25, 2022
FSNH	3d. Food and Human Health	September 1, 2022
FSNH	3e. Mitigating Antimicrobial Resistance Across the Food Chain	September 1, 2022
BNRE	4a. Soil Health	September 1, 2022
BNRE	4b. Water Quantity and Quality	September 1, 2022
BNRE	4c. Sustainable Bioeconomy through Biobased Products	September 1, 2022
BNRE	4d. Sustainable Agroecosystems: Health, Functions, Processes and Management	September 15, 2022
AST	5a. Engineering for Agricultural Production and Processing	October 6, 2022
AST	5b. Biorefining and Biomanufacturing	October 6, 2022
AST	5c. Nanotechnology for Agricultural and Food Systems	August 25, 2022
AST	5d. Engineering for Precision Crop and Water Management	October 6, 2022
AERC	6a. Small and Medium-Sized Farms	September 22, 2022
AERC	6b. Economics, Markets and Trade	October 6, 2022
AERC	6c. Social Implications of Food and Agricultural Technologies	November 3, 2022
AERC	6d. Rural Economic Development	September 15, 2022
AERC	6e. Environmental and Natural Resource Economics	September 15, 2022
Crosscutting	7a. Agricultural Microbiomes in Plant Systems and Natural Resources	October 6, 2022
Crosscutting	7b. Critical Agricultural Research and Extension (CARE)	September 15, 2022
Crosscutting	7c. Data Science for Food and Agricultural Systems (DSFAS)	November 17, 2022
Crosscutting	7d. Inter-Disciplinary Engagement in Animal Systems (IDEAS)	October 6, 2022
Crosscutting	7e. Agricultural Biosecurity	October 20, 2022

[1] PHPPP=Plant Health and Production and Plant Products, AHPAP=Animal Health and Production and Animal Products; FSNH=Food Safety, Nutrition, and Health; BNRE=Bioenergy, Natural Resources, and Environment; AST=Agriculture Systems and Technology; AERC=Agriculture Economics and Rural Communities; Crosscutting=Crosscutting Programs
[2] All applications must be received by 5 p.m. EST on the deadline date.

Priority Area[1]	Program Area	2022 Review Cycle Deadlines[2]
Crosscutting	7f. Extension, Education & USDA Climate Hubs Partnership	October 6, 2022
Crosscutting	7g. AFRI Commodity Board Co-funding Topics	July 14~~May 12~~, 2022
Crosscutting	7h. Rapid Response to Extreme Weather Events Across Food and Agricultural Systems (CAP Grants)	May 12, 2022
Crosscutting	7i. Regional Innovation and Demonstration of Climate-smart Agriculture for Future Farms (CAFF)	October 6, 2022
Crosscutting	7j. Center of Excellence for Meat and Poultry Processing and Food Safety Research and Innovation (MPPFSRI)	November 3, 2022

2022 UPDATES

1. This RFA covers the FY 2022 grant review cycle. For the FY 2022 review cycle, funding from FY 2022 and FY 2023 budgets will be used.

2. All applicants who meet the eligibility requirement as a New Investigator (see *Part II § C*), will also be eligible to apply for a seed grant, as well as for a New Investigator (standard) grant. While all seed grant applications submitted to a program area priority will be evaluated together, seed grant applications from New Investigators will not compete for funding with applications from strengthening-eligible (see *Part II § C*) institutions. More information about seed grants is in the "AFRI Grant Types" PDF in the attachments list on the AFRI RFA Resources page.

3. Year-round conference grant applications are accepted after submission of the Letter of Intent, see *Part I § C* for more information on which programs accept conference grants. The LOI must be submitted at least 195 days before the start of the conference. The full Conference Grant application must be submitted, at minimum, 150 days before the start of the conference.

4. The addition of three program area priorities: Environmental and Natural Resource Economics (A1651) within Agriculture Economics and Rural Communities; Rapid Response to Extreme Weather Events Across Food and Agricultural Systems (A1712) within Crosscutting Programs; and Regional Innovation and Demonstration of Climate-smart Agriculture for Future Farms (CAFF) (A1556) within Crosscutting Programs.

5. Engineering for Agricultural Production Systems has been split into two program area priorities in Agriculture Systems and Technology: Engineering for Agricultural Production and Processing (A1521) and Engineering for Precision Crop and Water Management (A1551).

TABLE OF CONTENTS

EXECUTIVE SUMMARY **4**

2022 UPDATES **7**

TABLE OF CONTENTS **8**

TABLE OF TABLES **10**

PART I. FUNDING OPPORTUNITY DESCRIPTION **12**
A. Legislative Authority 12
B. Purpose and Priorities 12
C. Program Area Description 14
1. Plant Health and Production and Plant Products 14
2. Animal Health and Production and Animal Products 30
3. Food Safety, Nutrition, and Health 42
4. Bioenergy, Natural Resources, and Environment 51
5. Agriculture Systems and Technology 61
6. Agriculture Economics and Rural Communities 71
7. Crosscutting Programs 83

PART II. AWARD INFORMATION **115**
A. Available Funding 115
B. Application Restrictions 115
C. Project and Grant Types 116
D. Ethical Conduct of Funded Projects 116
E. Partnership Opportunities 116

PART III. ELIGIBILITY INFORMATION **118**
A. Eligibility Requirements 118
B. Request for Determination of Status 119
C. Cost Sharing or Matching 120
D. Centers of Excellence 120

PART IV. APPLICATION AND SUBMISSION **122**
A. Letter of Intent 122
B. Method of Application 122
C. Content and Form of the Application 123
D. Funding Restrictions 124

PART V. APPLICATION REVIEW REQUIREMENTS **126**
A. NIFA's Evaluation Process 126
B. Evaluation Criteria 127
C. Centers of Excellence 127
D. Organizational Management Information 127
E. Application Disposition 127

PART VI. AWARD ADMINISTRATION 128
A. General..... 128
B. Administrative and National Policy Requirements 128

PART VII. OTHER INFORMATION 129
A. Use of Funds and Changes in Budget..... 129
B. Confidential Aspects of Applications and Awards..... 129
C. Regulatory Information 129

APPENDIX I: AGENCY CONTACT..... 130

APPENDIX II: GLOSSARY OF TERMS..... 133

APPENDIX III: DEFINITIONS 134

APPENDIX IV: OTHER AFRI RESOURCES 137

TABLE OF TABLES

Table 1: Key Dates and Deadlines 2
Table 2: Program Area Priorities and Deadlines 5
Table 3: Foundational Knowledge of Agricultural Production Systems Key Information 16
Table 4: Foundational Knowledge of Plant Products Key Information 18
Table 5: Pests and Beneficial Species in Agricultural Production Systems Key Information 19
Table 6: Physiology of Agricultural Plants Key Information 22
Table 7: Plant Breeding for Agricultural Production Key Information 23
Table 8: Pollinator Health: Research and Applications Key Information 26
Table 9: Conventional Plant Breeding for Cultivar Development Key Information 28
Table 10: Animal Reproduction Key Information 31
Table 11: Animal Nutrition, Growth and Lactation Key Information 34
Table 12: Welfare of Agricultural Animals Key Information 36
Table 13: Diseases of Agricultural Animals Key Information 38
Table 14: Animal Breeding, Genetics, and Genomics Key Information 40
Table 15: Food Safety and Defense Key Information 43
Table 16: Novel Foods and Innovative Manufacturing Technologies Key Information 45
Table 17: Diet, Nutrition and the Prevention of Chronic Diseases Key Information 47
Table 18: Food and Human Health Key Information 48
Table 19: Mitigating Antimicrobial Resistance Across the Food Chain Key Information 50
Table 20: Soil Health Key Information 53
Table 21: Water Quantity and Quality Key Information 56
Table 22: Sustainable Bioeconomy through Biobased Products Key Information 57
Table 23: Sustainable Agroecosystems: Health, Functions, Processes and Management Key Information 59
Table 24: Engineering for Agricultural Production and Processing Key Information 63
Table 25: Biorefining and Biomanufacturing Key Information 64
Table 26: Nanotechnology for Agricultural and Food Systems Key Information 66
Table 27: Engineering for Precision Crop and Water Management Key Information 69
Table 28: Small and Medium-Sized Farms Key Information 72
Table 29: Economics, Markets and Trade Key Information 74
Table 30: Social Implications of Food and Agricultural Technologies Key Information 77
Table 31: Environmental and Natural Resource Economics Key Information 79
Table 32: Environmental and Natural Resource Economics Key Information 80
Table 33: Agricultural Microbiomes in Plant Systems and Natural Resources Key Information 83
Table 34: Critical Agricultural Research and Extension (CARE) Key Information 85
Table 35: Data Science for Food and Agricultural Systems (DSFAS) Key Information 88
Table 36: Inter-Disciplinary Engagement in Animal Systems (IDEAS) Key Information 93
Table 37: Agricultural Biosecurity Key Information 95
Table 38: Extension, Education & USDA Climate Hubs Partnership Key Information 97
Table 39: AFRI Commodity Board Co-funding Topics Key Information 101
Table 40: Rapid Response to Extreme Weather Events Across Food and Agricultural Systems Key Information 106
Table 41: Regional Innovation and Demonstration of Climate-smart Agriculture for Future Farms (CAFF) Key Information 109

Table 42. Steps to Obtain Application Materials 122
Table 43: Help and Resources 122
Table 44: Key Application Instructions 123

PART I. FUNDING OPPORTUNITY DESCRIPTION

A. Legislative Authority

Section 2(b) of the Competitive, Special, and Facilities Research Grant Act (hereafter referred to as the Act) (7 U.S.C. 3157), as amended, authorizes the Agriculture and Food Research Initiative (AFRI), a competitive grant program to provide funding for fundamental and applied research, education, and extension to address food and agricultural sciences in the following six priority areas:

1. Plant health and production and plant products;
2. Animal health and production and animal products;
3. Food safety, nutrition, and health;
4. Bioenergy, natural resources, and environment;
5. Agriculture systems and technology; and
6. Agriculture economics and rural communities.

To the maximum extent practicable, NIFA, in coordination with the Under Secretary for Research, Education, and Economics (REE), will make grants for high priority research, education, and extension, taking into consideration, when available, the determinations made by the National Agricultural Research, Extension, Education, and Economics Advisory Board (NAREEEAB) pursuant to the Competitive, Special, and Facilities Research Grant Act (7 U.S.C. 3157). The Secretary delegates the authority to the Under Secretary in 7 CFR 2.21, and the Under Secretary delegates that authority to NIFA.

B. Purpose and Priorities

The purpose of AFRI (listed in the Assistance Listings under number 10.310) is to support research, education, and extension projects that address key problems of local, regional, national, and global importance in sustaining conventional, organic, urban food, and agricultural and natural systems. These include farm and ranch production efficiency, profitability, and sustainability; bioenergy and bio-based products; forestry; aquaculture; rural communities and entrepreneurship; human nutrition; mitigating impacts of biotic and abiotic constraints on food production; food safety; mitigating food waste and food loss; physical and social sciences; rural human ecology; development of circular/regenerative economies, and genetic improvement of plant and animals. In addition, the economic sustainability of food systems is an overarching priority for the projects funded in response to this RFA; therefore, projects focusing on plant or animal species or commodities that are important to underserved communities, farmers, ranchers, or small- or medium-sized farms or ranches are also encouraged. Through this support, AFRI advances knowledge in both fundamental and applied sciences important to agriculture. Additionally, AFRI supports work in education and extension activities that deliver science-based knowledge to end users, allowing them to make informed, practical decisions. This AFRI RFA provides funding for research-only, extension-only, and integrated research, education, and/or extension projects addressing six priorities identified in *Part I § A*.

Food and agricultural systems face ever-growing constraints including growing populations; pressure on natural resources; challenges of climate variability and change; and complex demands of ensuring nutritional security and food safety in a global economy. Addressing these challenges requires research, education, extension, and integrated programs in concert with science-based approaches that increase agricultural and natural resource sustainability. The term

'sustainable agriculture' (7 U.S.C. 3103) means a combined system of plant and animal production practices relevant to site-specific application that will achieve the following long-term goals: 1) satisfy human food and fiber needs; 2) enhance environmental quality and the natural resource base upon which the agricultural economy and rural communities depend; 3) make the most efficient use of nonrenewable resources and on-farm resources and integrate natural biological cycles and controls; 4) sustain the economic viability of farm operations; and 5) enhance the quality of life for farmers and society as a whole. The AFRI program provides unique grants support for projects addressing sustainability of agricultural systems.

~~***Extension Foundation*** (formerly eXtension). AFRI encourages (but does not require) applicants to work with the Extension Foundation for the development and delivery of content for the public and for Extension professionals nationwide through Connect Extension, or a National Cooperative Extension Project website.~~

Global Engagement. NIFA supports global engagement that advances U.S. agricultural goals. NIFA recognizes that collaboration with international partners may be necessary to attain the agency's goals for U.S. agriculture, promote global competence of our nation's future agricultural workforce, and promote safe and nutritious food security in a growing world. Therefore, although application to this RFA is limited to eligible U.S. institutions, applicants may collaborate with international partners, to include subcontracts to international partners or other institutions. Applications must clearly demonstrate benefits to the United States. Additional guidance on including international activities is provided on the AFRI International Partnerships website.

Stakeholder Input
The AFRI Stakeholder Feedback page has information on AFRI-related stakeholder input.

Background
AFRI is NIFA's flagship competitive grants programs for food and agricultural sciences, and funding is offered through the Foundational and Applied Science, Sustainable Agricultural Systems, and Education and Workforce Development Requests for Applications for addressing critical societal issues.

The Foundational and Applied Science RFA program areas address the following priorities as well as all included subpriorities:

A. Plant Health and Production and Plant Products;
B. Animal Health and Production and Animal Products;
C. Food Safety, Nutrition, and Health;
D. Bioenergy, Natural Resources, and Environment;
E. Agriculture Systems and Technology; and
F. Agriculture Economics and Rural Communities.

This AFRI RFA will support projects that significantly advance foundational and applied sciences for the following USDA priority outcomes:

1. Human diversity, equity, inclusion, and access;
2. Agricultural practices that provide for adaptation to ecological perturbation and mitigate climate change;

3. Rural economic development and post-pandemic economic revitalization;
4. Nutritional security; and
5. Open and competitive markets.

The AFRI Foundational and Applied Science RFA is aligned with the following USDA Strategic Plan Goals:

1. Strategic Goal 1: Combat Climate Change to Support America's Working Lands, Natural Resources and Communities
2. Strategic Goal 2: Ensure America's Agricultural System is Equitable, Resilient, and Prosperous
3. Strategic Goal 3: Foster an Equitable and Competitive Marketplace for All Agricultural Producers
4. Strategic Goal 4: Provide All Americans Safe, Nutritious Food
5. Strategic Goal 5: Expand Opportunities for Economic Development and Improve Quality of Life in Rural and Tribal Communities

C. Program Area Description

NIFA is soliciting applications under seven AFRI program areas. The program areas and their respective approximate available funding amounts include:

1. Plant health and production and plant products ($66 million)
2. Animal health and production and animal products ($55 million)
3. Food safety, nutrition, and health ($39 million)
4. Bioenergy, natural resources, and environment ($33 million)
5. Agriculture systems and technology ($29 million)
6. Agriculture economics and rural communities ($34 million)
7. Crosscutting programs ($42 million)

1. Plant Health and Production and Plant Products

Background

Monumental gains in American crop productivity over the past 60 years are the result of innovations in agricultural production practices, plant breeding, and pest management. The goal of the Plant Health and Production and Plant Products (PHPPP) program area is to ensure continued production gains are achieved through break-through discoveries and the translation of these into plant production and protection practices. The outcomes of these projects are expected to increase production efficiencies and combat persistent threats and new challenges, including climate change, that limit the achievement of dependable yields across variable growing conditions.

Plant-based agriculture is changing with the introduction of new engineering, technology, and information tools. Further improvements to plant agriculture will require a greater understanding of complex, inter-related factors, across a wide range of scales. These include investigations of plant and pest biology at the molecular, cellular, whole-organism, and systems levels to increase performance and provide protection from biotic and abiotic stressors increasingly exacerbated by climate change. New traits are being discovered and varieties developed using gene editing and other advanced breeding methods. Optimal integration of production system components is sought to ensure practices and products are safe for consumers and achieved with good

stewardship of natural resources and efficient use of human capital. By supporting extension programming and training the next generation of scientists, new technologies will be made readily available to end-users and put into practice. This strategy will ensure that the United States continues to be a leader in the agricultural sciences and a reliable source for the expanding domestic and global demand for an abundant and secure supply of food, feed, natural fibers, wood, and other plant-based products.

In addition to the program area priorities described in this section, the **PHPPP** program area also supports the following program area priorities:

a. Agricultural Microbiomes in Plant Systems and Natural Resources (A1402) and Agricultural Biosecurity (A1181) program area priorities are described in Crosscutting Programs.
b. Plant Biotic Interactions will be offered through an interagency program with the National Science Foundation; the NIFA program contact is Dr. Kari Perez, (816) 550-8047 or kari.perez@usda.gov.

Total Program Funds: Approximately **$66** million

Key Information (Applicable to **All** Plant Health and Production and Plant Products Program Area Priorities):

a. All applications must adhere to the requirements in *Part IV*.
b. Choice of plant species (including crops, trees, and weeds) and objectives must be justified in terms of importance to agricultural food, feed, fiber, ornamental plants (including turf), planted forest, or industrial crop production systems in the United States. Projects focusing on plant species and commodities that are important to underserved farmers or small- or medium-sized farms are encouraged.
c. Applications from and collaborations with minority-serving institutions, small to mid-sized institutions, and/or institutions within the Established Program to Stimulate Competitive Research (EPSCoR) states are encouraged in this program area.
d. Applications that include collaborations with international partners may also be submitted. The AFRI International Partnerships webpage contains additional information on international partnerships.
e. Applications with highly complex, large scale, transdisciplinary, and integrated research, education, and extension projects that incorporate foundational knowledge from this program area should be submitted to the AFRI Sustainable Agricultural Systems program (A9201) described in the AFRI SAS RFA.
f. An applicant may submit a Conference Grant application anytime during the year. A Letter of Intent (LOI) is required for Conference Grant applications. The LOI must be submitted at least **195 days** before the start of the conference. The full Conference Grant application must be submitted, at minimum, **150 days** before the start of the conference.

Program Area Priorities – Each application must address at least **one of the seven** program area priorities listed below. Details about each of the PHPPP program area priorities are provided later in this section.

1a. Foundational Knowledge of Agricultural Production Systems
1b. Foundational Knowledge of Plant Products
1c. Pests and Beneficial Species in Agricultural Production Systems

1d. Physiology of Agricultural Plants
1e. Plant Breeding for Agricultural Production
1f. Pollinator Health: Research and Application
1g. Conventional Plant Breeding for Cultivar Development

1a. Foundational Knowledge of Agricultural Production Systems

Table 3: Foundational Knowledge of Agricultural Production Systems Key Information

Title	Description
Program Code:	A1102
Program Code Name:	Foundational Knowledge of Agricultural Production Systems
CFDA Number	10.310
Project Type(s):	Research and Integrated Projects only
Grant Type(s):	a. Standard, Conference, and FASE (Strengthening Standard, New Investigator, Strengthening Conference, Seed, Equipment, and Sabbatical) Grants only b. See *Part II § C.2* for requirements specific to conference and FASE Grant applications.
Letter of Intent Deadline	a. Required only for **Conference Grant** applications. The LOI must be submitted a minimum of 195 days before the conference begins. b. LOIs must follow the instructions in Part IV, A and be emailed to the program contact(s) below
Application Deadline(s)	a. **2022:** Thursday, September 15, 2022 (5:00 p.m. Eastern Time) b. **Conference Grants:** Submitted after LOI decision response and a minimum of 150 days before the conference begins
Grant Duration:	a. 36-60 months for **Standard Grants, Strengthening Standard Grants, and New Investigator Standard Grants** b. Up to 24 months for all **Seed Grants** c. Up to 12 months for **Sabbatical Grants** d. Up to 60 months for **Conference Grants**
Maximum Award Amount(s):	a. Including indirect costs: $650,000 for **Research Projects** b. Including indirect costs: $750,000 for **Integrated Projects** c. Including indirect costs: $300,000 for all **Seed Grants** d. $50,000 for **Conference and Equipment Grants**
Program Area Priority Contact(s):	a. Dr. Mathieu Ngouajio, (202) 570-1915 or mathieu.ngouajio@usda.gov b. Dr. John Erickson, (816) 283-6422 or john.erickson@usda.gov

Program Area Priority:

The Foundational Knowledge of Agricultural Production Systems program supports plant research to advance our knowledge for the wide range of agricultural production systems found across the rural-urban continuum, from conventional or organic open-fields to protected built environments. Research will address critical or process-limiting dynamics that occur among and within the various management components of a production system using experimental manipulations of system components, technological interventions, system analyses, modeling, or agroecological approaches. Results are expected to lead to the development of innovative

sustainable solutions to challenges limiting or threatening the productivity, profitability, and good stewardship of natural resources, environment, and human capital. Projects involving the use of indigenous traditional ecological knowledge in designing agricultural systems will be appropriate for this program area priority. Also encouraged are applications that incorporate virtual learning options, where appropriate and practical for integrated programs.

Applications must address one or more of the following (order does not indicate importance):

a. Investigate how multiple management components of agricultural production systems can be integrated to enhance soil-crop-atmospheric processes or resilience to various biotic and abiotic stressors including those exacerbated by climate change, and improve product quality and/or productivity;
b. Determine how production systems, including regenerative systems, can alter the structure of microbial communities associated with plants, soils, or other growing media; the ways alterations affect functions such as plant nutrient uptake/utilization efficiency; and resilience to weeds, insects, diseases, weather extremes associated with climate change, and other stressors that influence productivity and/or product quality (including nutritional quality);
c. Investigate how changes to cropping systems, including diversification or intensification, affect crop performance, soil health, and other outcomes beneficial to system resilience; or
d. Conduct syntheses and meta-analyses of existing data or develop new or extend existing models to derive general principles about the function, properties, and performance of agricultural production systems.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Projects focusing on species and commodities that are important to underserved farmers or small- or medium-sized farms are encouraged.
c. Projects supported by Foundational Knowledge of Agricultural Production Systems program area priority can serve as building blocks needed for large inter- and trans-disciplinary projects funded by the AFRI Sustainable Agricultural Systems program.
d. Appropriate plant-based production systems for study include food, feed, fiber, ornamental plants (including turf), industrial crops; harvested forages; pastures; seaweeds; and planted forests. Conventional, organic, and protected systems (including hydroponics, aquaponics, aeroponics, vertical farming, and other controlled environment production systems) are appropriate for study.
e. The production system studied could include key management components such as: integrated crop management, soil or other growing media fertility, soil health, agronomic practices, agroforestry, cover cropping, biodiversification, economics, integrated management of target pests (including arthropods, nematodes, pathogens, and weeds), automation, and worker well-being and safety.
f. Development of innovative production systems to optimize the production of high-valued plant-based products are encouraged. Plant-based products may include but are not limited to oil, fiber, nutra- and pharmaceuticals, nutrients, proteins, juices, fragrances, resins, and biopesticides.

g. Applicants must ensure applications are submitted to the right program or program area priority, for instance:
   1) Applications to study management of pests or beneficial species may be more appropriate for the Pests and Beneficial Species in Agricultural Production Systems program area priority (A1112)
   2) Applications to study microbiome function may be more appropriate for the Agricultural Microbiomes in Plant Systems and Natural Resources program area priority (A1402 in Crosscutting Programs)
   3) Applications to study aquatic animals in aquaponics systems may be more appropriate for the Small and Medium-Sized Farms program area priority (A1601) or the Economics, Markets and Trade program area priority (A1641) described in the Agriculture Economics and Rural Communities program area of this RFA
h. The Foundational Knowledge of Agricultural Production Systems program does not support projects focused on livestock. Please refer to the Animal Health and Production and Animal Products program area, described elsewhere in this RFA.
i. Applications focusing on climate change, ecosystems services, rangelands, or addressing issues at the landscape or regional scale may be more appropriate for the Sustainable Agroecosystems: Health, Functions, Processes and Management Program Area Priority (A1451).

1b. Foundational Knowledge of Plant Products

Table 4: Foundational Knowledge of Plant Products Key Information

Title	Description
Program Code:	A1103
Program Code Name:	Foundational Knowledge of Plant Products
CFDA Number	10.310
Project Type(s):	Research Projects only
Grant Type(s):	a. Standard, Conference, and FASE (Strengthening Standard, New Investigator, Strengthening Conference, Seed, Equipment, and Sabbatical) Grants **only for Plant Products** b. See *Part II § C.2* for requirements specific to conference and FASE Grant applications.
Letter of Intent Deadline	a. Required only for **Conference Grant** applications. The LOI must be submitted a minimum of 195 days before the conference begins. b. LOIs must follow the instructions in Part IV, A and be emailed to the program contact(s) below
Application Deadline(s)	a. **2022:** Thursday, August 18, 2022 (5:00 p.m. Eastern Time) b. **Conference Grants:** submitted after LOI decision response and a minimum of 150 days before the conference begins
Grant Duration:	a. 36-48 months for **Plant Products** b. Up to 24 months for all **Seed Grants** c. Up to 12 months for **Sabbatical Grants** d. Up to 60 months for **Conference Grants**

Title	Description
Maximum Award Amount(s):	a. Including indirect costs: $650,000 for **Standard Grants, Strengthening Standard Grants, and New Investigator Standard Grants** b. Including indirect costs: $300,000 for all **Seed Grants** c. $50,000 for **Conference and Equipment Grants**
Program Area Priority Contact(s):	a. Dr. Vance Owens, (816) 283-6925 or vance.owens@usda.gov b. Dr. Victoria Finkenstadt, (816) 520-8456 or victoria.finkenstadt@usda.gov

Program Area Priority:
The Foundational Knowledge of Plant Products program supports projects to study the biosynthesis of plant-derived, high-value biomolecules for use in foods, pharmaceuticals, and other products. Projects must focus on agriculturally-important plants, but the choice of plant species must be justified. Molecular, biochemical, synthetic biology, or eco-physiological approaches may be used to determine the biosynthetic pathways for industrially-important biomolecules. The intent of this program is for results to be translated into discoveries that help create or meet emerging and future markets and contribute towards long-term demand for agricultural-based products.

Applications must address one or more of the following (order does not indicate importance):

a. Primary and/or secondary metabolic pathways regulating the biosynthesis of plant metabolites that improve the quality of food and/or feed;
b. Biosynthetic pathways of metabolites with herbicidal or pesticidal activities;
c. Improving the production (biosynthesis) of plant-based chemicals that have industrial and/or pharmaceutical relevance; or
d. Macronutrient and/or micronutrient biosynthesis, accumulation, and/or availability that are beneficial to human health and nutrition

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Projects focusing on species and commodities that are important to underserved farmers or small- or medium-sized farms are encouraged.
c. Applications that address topics related to medicinal studies or human health are not appropriate for this program area priority.
d. Applications that address plant physiology or environmental responses may be more appropriate for Physiology of Agricultural Plants (A1152).

1c. <u>Pests and Beneficial Species in Agricultural Production Systems</u>

Table 5: Pests and Beneficial Species in Agricultural Production Systems Key Information

Title	Description
Program Code:	A1112
Program Code Name:	Pests and Beneficial Species in Agricultural Production Systems
CFDA Number	10.310

Title	Description
Project Type(s):	Research-only and Integrated Projects (Research and Extension) only
Grant Type(s):	a. Standard, Conference, and FASE (Strengthening Standard, New Investigator, Strengthening Conference, Seed, Equipment, and Sabbatical) Grants only b. See *Part II § C.2* for requirements specific to conference and FASE Grant applications.
Letter of Intent Deadline	a. Required only for **Conference Grant** applications. The LOI must be submitted a minimum of 195 days before the conference begins. b. LOIs must follow the instructions in Part IV, A and be emailed to the program contact(s) below
Application Deadline(s)	a. **2022:** Thursday, August 25, 2022 (5:00 p.m. Eastern Time) b. **Conference Grants:** submitted after LOI decision response and a minimum of 150 days before the conference begins
Grant Duration:	a. 36-60 months for **Standard Grants, Strengthening Standard Grants, and New Investigator Standard Grants** b. Up to 24 months for all **Seed Grants** c. Up to 12 months for **Sabbatical Grants** d. Up to 60 months for **Conference Grants**
Maximum Award Amount(s):	a. Including indirect costs: $750,000 for **Standard Grants, Strengthening Standard Grants, and New Investigator Standard Grants** b. Including indirect costs: $300,000 for all **Seed Grants** c. $50,000 for **Conference and Equipment Grants**
Program Area Priority Contact(s):	a. Dr. Erica Kistner-Thomas, (816) 894-9283 or erica.kistnerthomas@usda.gov ~~b. Dr. Christopher Phillips, christopher.phillips@usda.gov~~ b. Dr. Chris Philips, christopher.philips@usda.gov

Program Area Priority:
The goal of the Pests and Beneficial Species in Agricultural Production Systems program is to advance knowledge of invasive or established plant pests and associated beneficial species leading to innovative and biologically-based strategies to manage pests. Appropriate plant-based agricultural production systems for study include food and fiber crops, ornamental plants (including turf), and managed grasslands, rangelands and planted forests. Conventional, organic, and protected systems (including hydroponics, aquaponics, aeroponics, vertical farming, and other controlled environment agricultural systems) are appropriate for study. Pests may include invertebrates, plant pathogens and/or their vectors, nematodes or weeds. Beneficial species in this program will be restricted to biological control agents and microbes that play a role in pest management. Molecular, organismal, population, and/or community approaches are appropriate to this program. Both foundational and translational projects are encouraged.

Applications must address one or more of the following (order does not indicate importance):

a. Biotic and abiotic factors, affecting the abundance or spread of agriculturally-important plant pests, disease vectors, or beneficial species relevant to pest management; factors may include (but are not limited to) other plant pests or beneficial species, climate

change, plant compounds, pesticides, or toxins;

b. Behavioral attributes of pests and beneficial species, including intra- or interspecies interactions and/or communication systems relevant to pest management;
c. Factors that contribute to invasiveness, including (but not limited to) studies using population genetics/genomic approaches or models to predict, prevent or manage outbreaks, or to pinpoint geographic distribution or origin;
d. Movement or dispersal dynamics of pests or beneficial organisms, including pests that vector plant diseases; this could include epidemiological factors that influence disease spread, the influence of agronomic practices on weed populations, and research on aspects of weed biology that impact reproductive biology, seed bank dynamics, and other population-level aspects;
e. Mechanisms of pest resistance to pesticides or toxins in genetically-modified plants (e.g., fungicides, herbicides, insecticides, or Bt toxin) and development of strategies to mitigate resistance and/or crop failure;
f. Use of indigenous traditional ecological knowledge in pest and disease control; or
g. Conference applications that bring together experts in weed biology, plant genomics, herbicide resistance, and data science to better understand how genomic information could lead to novel solutions to manage weeds, how data will be used and maintained, and the underlying molecular mechanisms that contribute to invasiveness.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Projects focusing on species and commodities that are important to underserved farmers or small- or medium-sized farms are encouraged.
c. Applicants must ensure applications are submitted to the right program or program area priority, for instance:
    1) Applications that address topics related to pollinators are not appropriate for this program area priority; consider submitting to the Pollinator Health: Research and Application (A1113).
    2) Studies involving molecular mechanisms that mediate interactions of plants with their biotic partners may be appropriate for the NSF/NIFA Plant Biotic Interactions program.
    3) Applications to study microbiome function may be more appropriate for the Agricultural Microbiomes in Plant Systems and Natural Resources program area priority (A1402 in Crosscutting Programs).
d. Applications to study pests of livestock or humans (e.g., vectors of human diseases or nuisance pests such as flies, bed bugs, cockroaches, and termites) are not appropriate for this program area priority. Instead, consider submitting to the Animal Health and Production and Animal Products program area if you are studying pests of livestock, or to the Crop Protection and Pest Management RFA if your work is focused on nuisance pests in urban or rural systems.
e. Applications for work on big data analytics and tool development to support the development of a data network and cyberinfrastructure for pests and beneficial species should be submitted to the Data Science for Food and Agriculture Systems (DSFAS) program area priority (A1541 in Crosscutting Programs).

f. Projects associated with the initiative to sequence 5,000 arthropod genomes (i5K) are encouraged to link with the National Agricultural Library's i5k workspace.
g. NIFA is partnering with Ireland and Northern Ireland under the U.S.-Ireland Research and Development Partnership to solicit collaborative research applications in the Pests and Beneficial Species in Agricultural Production Systems program area priority. For more information including FAQs about this program, visit the NIFA, Ireland, and Northern Ireland partnership page. Applicants submitting to this partnership must select Collaborative as the grant type and their application title should begin as "TRIPARTITE: [full title]".

1d. Physiology of Agricultural Plants

Table 6: Physiology of Agricultural Plants Key Information

Title	Description
Program Code:	A1152
Program Code Name:	Physiology of Agricultural Plants
CFDA Number	10.310
Project Type(s):	Research Projects only
Grant Type(s):	a. Standard, Conference, and FASE (Strengthening Standard, New Investigator, Strengthening Conference, Seed, Equipment, and Sabbatical) Grants only b. See *Part II § C.2* for requirements specific to conference and FASE Grant applications.
Letter of Intent Deadline	a. Required only for **Conference Grant** applications. The LOI must be submitted a minimum of 195 days before the conference begins. b. LOIs must follow the instructions in Part IV, A and be emailed to the program contact(s) below
Application Deadline(s)	a. **2022:** Thursday, October 6, 2022 (5:00 p.m. Eastern Time) b. **Conference Grants:** submitted after LOI decision response and a minimum of 150 days before the conference begins
Grant Duration:	a. 36-60 months for **Standard Grants, Strengthening Standard Grants, and New Investigator Grants** b. Up to 24 months for all **Seed Grants** c. Up to 12 months for **Sabbatical Grants** d. Up to 60 months for **Conference Grants**
Maximum Award Amount(s):	a. Including indirect costs: $650,000 for **Standard Grants, Strengthening Standard Grants, and New Investigator Standard Grants**; $800,000 with specific partnerships (see *Part II § E*) b. Including indirect costs: $300,000 for all **Seed Grants** c. $50,000 for **Conference and Equipment Grants**
Program Area Priority Contact(s):	Dr. John Erickson, (816) 283-6422 or john.erickson@usda.gov

Program Area Priority:

The Physiology of Agricultural Plants program will support projects to improve productivity or

other performance factors of agriculturally-important plants (including weeds) using molecular, biochemical, whole-plant, agronomic, or eco-physiological approaches. The genetic basis of important traits identified through these studies are expected to translate into plant varieties with improved yield or product quality, or growth resilience to adverse environmental conditions including those associated with climate change.

This program area priority will support research in the following areas:

a. Plant growth and developmental processes, including plant architecture, carbon assimilation, and source-sink relationships;
b. Mechanisms of plant response to abiotic stresses, including increased water use efficiency; or
c. Nutrient uptake, assimilation, and/or utilization, particularly increased plant use efficiency for nitrogen, phosphorus, or other supplemental nutrients.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Projects focusing on species and commodities that are important to underserved farmers or small- or medium-sized farms are encouraged.
c. Relevance to agriculturally-important traits should be clearly justified and specific.
d. Projects with specific types of partnerships (small and mid-sized or minority-serving degree-granting institutions not on the list of most successful institutions; EPSCoR institutions; or international partners) have the opportunity to request up to an additional $150,000 as specified in the key information table. See *Part II § E* for detailed eligibility restrictions.
e. For studies that involve microbes in plant nutrient utilization or abiotic stress tolerance, consider the Agricultural Microbiomes program area priority (in Crosscutting Programs) or the NSF/NIFA Plant Biotic Interactions program to determine the best fit for the project.

1e. Plant Breeding for Agricultural Production

Table 7: Plant Breeding for Agricultural Production Key Information

Title	Description
Program Code:	A1141
Program Code Name:	Plant Breeding for Agricultural Production
CFDA Number	10.310
Project Type(s):	Research and Integrated Projects only
Grant Type(s):	a. Standard, Conference, and FASE (Strengthening Standard, New Investigator, Strengthening Conference, Seed, Equipment, and Sabbatical) Grants **only for Plant Breeding Projects** b. Standard and FASE (Strengthening Standard) Grants **only for Coordination Innovation Networks** c. See *Part II § C.2* for requirements specific to conference and FASE Grant applications.

Title	Description
Letter of Intent Deadline	a. Required only for **Conference Grant** applications. The LOI must be submitted a minimum of 195 days before the conference begins. b. LOIs must follow the instructions in Part IV, A and be emailed to the program contact(s) below
Application Deadline(s)	a. **2022:** Thursday, September 22, 2022 (5:00 p.m. Eastern Time) b. **Conference Grants:** submitted after LOI decision response and a minimum of 150 days before the conference begins
Grant Duration:	a. 36-48 months for **Plant Breeding** b. Up to 60 months for **Coordination Innovation Networks** c. Up to 24 months for all **Seed Grants** d. Up to 12 months for **Sabbatical Grants** e. Up to 60 months for **Conference Grants**
Maximum Award Amount(s):	a. Including indirect costs: $650,000 for **Plant Breeding Projects**; $800,000 with specific partnerships (see Part II, D) b. Including indirect costs: $1,000,000 for **Coordination Innovation Networks**; $1,150,000 with specific partnerships (see Part II, D) c. Including indirect costs: $300,000 for all **Seed Grants** d. $50,000 for **Conference and Equipment Grants**
Program Area Priority Contact(s):	a. Dr. Christian Tobias, (610) 312-7619 or christian.tobias@usda.gov b. Dr. Ann Stapleton, (816) 274-1942 or ann.stapleton@usda.gov

Program Area Priority:
The Plant Breeding for Agricultural Production program will support public breeding efforts to improve crop productivity, efficiency, quality, and performance. Research is encouraged to genetically dissect and then introduce desirable traits that may include, but are not limited to: increased nutrient use efficiency; increased photosynthetic efficiency; tolerance to drought, flood and temperature extremes associated with climate change; resistance to pests and diseases; improved taste, aroma, or nutrition; and removal of undesirable traits through the use of both traditional genetic approaches and targeted gene editing.

The Plant Breeding for Agricultural Production program applications must address one of the following:

a. **Plant Breeding** projects focused on pre-breeding and germplasm enhancement; participatory breeding; selection theory; applied quantitative genetics; phenomics; or the incorporation of modeling (including crop growth models) in breeding. Explainable artificial intelligence research on ways to leverage parameters and processes that directly relate to theory, genetics and crop models is also encouraged. Proposed budget requests must not exceed **$650,000** total per project (including indirect costs) for project periods three to four years.
    1) Plant Breeding projects with specific types of partnerships (small and mid-sized or minority-serving degree-granting institutions not on the list of most successful institutions; EPSCoR institutions; or international partners) have the opportunity to request up to an additional $150,000 for a total of $800,000. See *Part II § E* for detailed eligibility restrictions.
b. **Plant Breeding Coordinated Innovation Networks (CIN)** that build and coordinate

public – private research and development efforts for major crop plants. The Network must address a grand challenge (e.g., nutrition security, boosting farm income, climate-safe agriculture) using collaborative state-of-the-art science and technical platforms that fill critical science and knowledge gaps to deliver innovation for commercialization across a broad US agricultural sector. CIN priority areas of innovation must aim to address bottlenecks to crop productivity and address the public breeding priorities in the USDA plant breeding roadmap (https://www.usda.gov/topics/plants).

1) Applications for integrated or research **Coordinated Innovation Networks (CIN)** should start their titles as "**Plant Breeding-CIN:** [full title…]" and should address the priorities listed immediately above and the following:
   a) **Synergy:** There should be a demonstrable benefit to the existence of a multidisciplinary, multi-sector, or multifunctional CIN that would not otherwise be possible by the participating entities and individuals operating independently. Proposals must outline how they seek to build on known science and/or create urgently needed technical knowledge and breakthrough innovations via a coordinated and collaborative Network. Training and capacity building is required and must be clearly described. Activities and technical plans must be designed to leverage the different strengths of the Network partners. Applications that include international partnerships are encouraged.
   b) **Contribution:** Each participating individual or entity should have a unique, meaningful, and active contribution to the network that is critical to the network's functioning, performance, and success in addressing bottlenecks in critical areas. How the Network connects to more downstream components in the value chain, such as private industry for the commercial aspects of product development that are critical for impact, must also be described.
   c) **Continuity:** There should be a sustainability plan for network persistence beyond the duration of initial grant support (e.g., identification of additional funding sources and/or more formal organizational arrangements).
   d) **Management:** There should be a plan for coordination and oversight including, but not limited to, communication, leadership, advisory boards, milestones, and evolution over time (e.g., new objectives or new participants). Clearly defined targets and goals that lead to impact, including major milestones and deliverables, must be illustrated.
2) Plant Breeding CIN projects with specific types of partnerships (small and mid-sized or minority-serving degree-granting institutions not on the list of most successful institutions; EPSCoR institutions; or international partners) have the opportunity to request up to an additional $150,000 for a total of $1,150,000. See *Part II § E* for detailed eligibility restrictions.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Projects focusing on species and commodities that are important to underserved farmers or small- or medium-sized farms are encouraged.
c. Choice of plant species and objectives must be justified in terms of importance to agricultural food, feed, fiber, ornamental plants (including turf), small and beginning

farmers, or industrial crop production systems in the United States. Crops and germplasm tribal food systems using indigenous traditional ecological knowledge are appropriate for this network.

d. Research that incorporates education of field-based plant breeders is encouraged.
e. Relevance to cultivar development should be clearly justified, demonstrable, and specific.
f. Data management plan: Use of automated plan builders is encouraged, for example, the DMP Tool; Inclusion of a plan and process for updating the data management plan to incorporate new knowledge on best practices is strongly advised; Incorporation of FAIR best practices is strongly encouraged.
g. Release or distribution of plant germplasm and other plant materials: Researchers must consult with the relevant National Plant Germplasm System (NPGS) crop curator to determine whether and how to deposit plant germplasm, plant cultivars, transgenic plants, plant mutants, plant populations, or other kinds of plant materials into the NPGS genebanks and stock centers. Project directors must confer with the relevant crop curators and Crop Germplasm Committees early in the application development process regarding the desirability of submitting the preceding plant materials generated by NIFA funding for deposit into NPGS genebanks and stock centers. More information is available on the NPGS website.
h. Applications for work on big data analytics and tool development are solicited to support the development of a plant breeding data network and cyberinfrastructure with the requirement to convert large amounts of data into knowledge and applications through computer analytics and modeling. Such applications must be submitted to the Data Science for Food and Agriculture Systems (DSFAS) program area priority (A1541 in Crosscutting Programs).
i. Applications focused on cultivar development should be submitted to the Conventional Plant Breeding for Cultivar Development program area priority (A1143).

1f. Pollinator Health: Research and Applications

Table 8: Pollinator Health: Research and Applications Key Information

Title	Description
Program Code:	A1113
Program Code Name:	Pollinator Health: Research and Applications
CFDA Number	10.310
Project Type(s):	Single Function Research, Education or Extension and Integrated Projects (Research and Extension only) only
Grant Type(s):	a. Standard, Conference, and FASE (Strengthening Standard, New Investigator, Strengthening Conference, Seed, Equipment, and Sabbatical) Grants only b. See *Part II § C.2* for requirements specific to conference and FASE Grant applications.
Letter of Intent Deadline	a. Required only for **Conference Grant** applications. The LOI must be submitted a minimum of 195 days before the conference begins. b. LOIs must follow the instructions in Part IV, A and be emailed to the program contact(s) below
Application	a. **2022:** Thursday, August 25, 2022 (5:00 p.m. Eastern Time)

Title	Description
Deadline(s)	b. **Conference Grants:** submitted after LOI decision response and a minimum of 150 days before the conference begins
Grant Duration:	a. 36-60 months **for Standard Grants, Strengthening Standard Grants, and New Investigator Standard Grants** b. Up to 60 months for **Coordination Innovation Networks** c. Up to 24 months for all **Seed Grants** d. Up to 12 months for **Sabbatical Grants** e. Up to 60 months for **Conference Grants**
Maximum Award Amount(s):	a. Including indirect costs: $750,000 for **Standard Grants, Strengthening Standard Grants, and New Investigator Standard Grants** b. Including indirect costs: $650,000 for **Coordination Innovation Networks** c. Including indirect costs: $300,000 for all **Seed Grants** d. $50,000 for **Conference and Equipment Grants**
Program Area Priority Contact(s):	a. Dr. Erica Kistner-Thomas, (816) 894-9283 or erica.kistnerthomas@usda.gov ~~b. Dr. Christopher Phillips, christopher.phillips@usda.gov~~ b. Dr. Chris Philips, christopher.philips@usda.gov

Program Area Priority:
The Pollinator Health: Research and Application program supports single-function projects (research, extension or education) with the goal of promoting healthy populations of animal pollinators in agricultural systems where reliance of crops on pollinators for pollination services is increasing and where declines of pollinators is evident. The declining health of pollinator populations poses a serious risk to crops that depend on pollinators for the production of marketable commodities and could ultimately impact the nation's food security. Several factors are significantly impacting the health of pollinator populations, including pests, diseases, pesticides, pollutants or toxins, nutritional deficits; climate change, agricultural production intensification, and habitat loss; reduced species or genetic diversity; and pollinator or crop management practices. Recent research also indicates that changes in bee gut microbial communities could have effects on nutritional health, disease resistance, or susceptibility to pesticides. However, the mechanisms that underlie these effects on pollinator health need further research. Studies involving ecological, behavioral, genomic, physiological, biophysical, sociological, and/or economic approaches will be considered for funding. Targeted multi-year monitoring of selected species in the context of research is also appropriate. Projects using indigenous traditional ecological knowledge are appropriate for this program area priority.

Applications must address one or more of the following (order does not indicate importance):

a. Factors that influence the abundance, diversity and health of pollinators. Examples may include biotic, abiotic as well as social, cultural or economic phenomena.
b. Functions of the microbiome associated with pollinators and their role in promoting healthy populations.
c. Development and evaluation of innovative tools and management practices that would likely be adopted by stakeholders to ensure healthy pollinators. Examples include, but are

not limited to, innovative genetic/genomic and breeding tools, diagnostic techniques, other cutting-edge technologies, alternative chemicals or biologically-based strategies to combat varroa mites or key bee diseases.

d. Development, implementation and/or evaluation of management practices of other crop pests/diseases that also ensure protection of pollinators and other beneficial species (e.g., integrated pest and pollinator management). Engagement of extension leaders with one or more types of stakeholders (crop producers, consultants, agribusinesses, non-profit organizations, land managers, beekeepers or others managing native pollinators) is strongly encouraged. Experience working with stakeholders to overcome barriers to adoption of integrated pest and pollinator management practices is recommended. Letters of support or collaboration with stakeholders should be included in the application.
e. Education-only that target K-14 level students to advance learning about pollinators in agricultural and associated landscapes. Non-exhaustive examples of educational approaches include curriculum development, experiential learning projects, learning opportunities that increase scientific knowledge, or other creative projects related to pollinators.
f. Extension only projects that include informal training, workshops or demonstration projects related to pollinators in agriculture and associated systems.
g. Establishment of a Research Coordination Network for a National Native Bee Monitoring Plan. Applications are solicited to foster national-level coordination of efforts to reliably assess the status and trends of agriculturally-important native bee species on a national scale. We will likely only fund one proposal of this type nationally. The purpose is not to fund research itself, but to support broad coordination of ongoing research efforts already funded. Partnerships with existing Federal and state governments and private and non-profit organizations are encouraged. Connections with existing biological inventories or networks should also be emphasized. Network activities may include but are not limited to: training the next generation of scientists in bee taxonomy using traditional and molecular approaches; development of minimum standards and methods for data collection and integration of data sets; plans for long-term data management, data storage, and data sharing; linkages with publicly-accessible databases for collection information, tool development, sampling methods and data curation plans.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. A broad range of plant systems are appropriate, such as fruit, vegetable, nut and oil seed crops, habitat in conservation reserve programs, cover crops, hedgerows, rangelands, horticultural crops, prairies, forests, agroforestry systems, etc. Rural, semi-rural and urban systems are also appropriate.
c. Proposals to establish a research coordination network must include a management plan that clearly delineates the specific roles and responsibilities of individuals, agencies or private industries or land managers (e.g., research coordination, leveraging additional funds or other resources, sharing data and information, or citizen engagement).

1g. <u>Conventional Plant Breeding for Cultivar Development</u>

Table 9: Conventional Plant Breeding for Cultivar Development Key Information

Title	Description
Program Code:	A1143
Program Code Name:	Conventional Plant Breeding for Cultivar Development
CFDA Number	10.310
Project Type(s):	Research Projects only
Grant Type(s):	a. Standard, Conference, and FASE (Strengthening Standard, New Investigator, Strengthening Conference, Seed, Equipment, and Sabbatical) Grants only b. See *Part II § C.2* for requirements specific to conference and FASE Grant applications.
Letter of Intent Deadline	a. Required only for **Conference Grant** applications. The LOI must be submitted a minimum of 195 days before the conference begins. b. LOIs must follow the instructions in Part IV, A and be emailed to the program contact(s) below
Application Deadline(s)	a. **2022:** Thursday, September 22, 2022 (5:00 p.m. Eastern Time) b. **Conference Grants:** submitted after LOI decision response and a minimum of 150 days before the conference begins
Grant Duration:	a. 36-48 months for **Plant Breeding** b. Up to 60 months for **Coordination Innovation Networks** c. Up to 24 months for all **Seed Grants** d. Up to 12 months for **Sabbatical Grants** e. Up to 60 months for **Conference Grants**
Maximum Award Amount(s):	a. Including indirect costs: $500,000 for **Standard Grants, Strengthening Standard Grants, and New Investigator Standard Grants** b. Including indirect costs: $300,000 for all **Seed Grants** c. $50,000 for **Conference and Equipment Grants**
Program Area Priority Contact(s):	a. Dr. Christian Tobias, (610) 312-7619 or christian.tobias@usda.gov b. Dr. Ann Stapleton, (816) 274-1942 or ann.stapleton@usda.gov

Program Area Priority:
The Conventional Plant Breeding for Cultivar Development program will support public breeding efforts that provide farmers with greater access to locally and regionally adapted cultivars especially associated with climate change.

Applications for research must address later stages of cultivar development focused on testing and evaluation of developed materials in established regional trials with the primary goal of releasing publicly finished cultivars. Research proposals must include (1) how the cultivar will be released and marketed, (2) who owns the intellectual property, (3) letters of support from stakeholders, (4) how the research fits within the overall existing breeding program, and (5) how this support for later stages of cultivar development will enhance and increase the availability of cultivars in the market place within the duration of the award. In addition to the research, proposals may include requests for modern plant breeding equipment (e.g., ranging from field to seed or processing to laboratory) to support plant breeding program infrastructure. Stand-alone equipment proposals are not acceptable. Relevance and need to enhance cultivar development

must be clearly justified, demonstrable, and specific. Research that incorporates education of field-based plant breeders is strongly encouraged. Breeding for tribal food systems using indigenous traditional ecological knowledge is appropriate for this program area priority.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Projects focusing on species and commodities that are important to underserved farmers or small- or medium-sized farms are encouraged.
c. Release or distribution of plant germplasm and other plant materials: Researchers must consult with the relevant National Plant Germplasm System (NPGS) crop curator to determine whether and how to deposit plant germplasm, plant cultivars, transgenic plants, plant mutants, plant populations, or other kinds of plant materials into the NPGS genebanks and stock centers. Project directors must confer with the relevant crop curators and Crop Germplasm Committees early in the application development process regarding the desirability of submitting the preceding plant materials generated by NIFA funding for deposit into NPGS genebanks and stock centers. More information is available on the NPGS website.
d. Applications focused on plant breeding discovery research, prebreeding, breeding tools and methods should be submitted to the Plant Breeding for Agricultural Production program area priority (A1141).

2. Animal Health and Production and Animal Products

Background

Animal health and production play critical roles in the sustainability and competitiveness of U.S. agriculture. Livestock, poultry, equine, and aquaculture species contribute significantly to the nation's economy, global food production, and food security. For U.S. agriculture to remain globally competitive, a better understanding of the critical biological and physiological mechanisms underlying nutrition, growth, reproduction, and health in these species is needed, and is especially important in the presence of climate change. Basic and applied research at the genetic, genomic, molecular, cellular, microbiome, and organ systems levels is essential to control and prevent animal diseases, reduce animal health and production costs, enhance nutritional quality of animal products, and mitigate environmental impacts. New knowledge gained from this research will lead to better management strategies for both conventional and organic production systems to enhance production efficiency, improve animal health and welfare, and develop high quality animal products for human use. These strategies may include the application of biotechnology, conventional/classical breeding, and breed development. Projects focusing on animal species and commodities that are important to underserved farmers, ranchers or small- or medium-sized farms or ranches are encouraged. Recent advances in genome modification technologies, such as genome editing, holds promise as a novel tool for understanding the role of specific genes and gene products in animal biology, physiology, and production traits, as well as precision breeding. NIFA is soliciting proposals on genome editing in the programs areas given below as well as in the Inter-Disciplinary Engagement in Animal Systems program are priority (A1261).

Total program funds – Approximately **$55** million

Program Area Key Information applicable to ALL Animal Health and Production and Animal Products Program Area Priorities:

a. All applications must adhere to the requirements in *Part IV*.
b. Applications from and collaborations with minority-serving institutions, small to mid-sized institutions, and/or institutions within the EPSCoR states are encouraged in this program area.
c. Applications that include collaborations with international partners may also be submitted. The AFRI International Partnerships webpage contains additional information on international partnerships.
d. Applicants must justify the use of experimental model systems. Applications that primarily use non-agricultural or non-aquaculture species as models (*i.e.,* encompassing greater than 50% of the work proposed) will not be considered.
e. Applicants must articulate and demonstrate direct benefit of their proposed project to animal agriculture or aquaculture productivity, economics, sustainability, or rural communities, in addition to identifying relevance to the program area priority.
f. When appropriate, applicants must include statistical power analyses and describe the experimental design, experimental unit, replication and sample size for each experimental group.
g. Applications with highly complex, large scale, transdisciplinary, and integrated research, education, and extension projects that incorporate foundational knowledge from this program area should be submitted to the AFRI Sustainable Agricultural Systems program (A9201) described in the AFRI SAS RFA.
h. An applicant may submit a Conference Grant application anytime during the year. A Letter of Intent (LOI) is required for Conference Grant applications. The LOI must be submitted at least 195 days before the start of the conference. The full Conference Grant application must be submitted, at minimum, 150 days before the start of the conference.

Program Area Priorities – Each application must address at least one of the five program area priorities listed below. Details about each of the Animal Health and Production and Animal Products program area priorities are provided later in this section.

2a. Animal Reproduction
2b. Animal Nutrition, Growth and Lactation
2c. Welfare of Agricultural Animals
2d. Diseases of Agricultural Animals
2e. Animal Breeding, Genetics, and Genomics

2a. Animal Reproduction

Table 10: Animal Reproduction Key Information

Title	Description
Program Code:	A1211
Program Code Name:	Animal Reproduction
CFDA Number	10.310
Project Type(s):	Research Projects only

Title	Description
Grant Type(s):	a. Standard, Conference, and FASE (Strengthening Standard, New Investigator, Strengthening Conference, Seed, Equipment, and Sabbatical) Grants only b. See *Part II § C.2* for requirements specific to conference and FASE Grant applications.
Letter of Intent Deadline	a. Required only for **Conference Grant** applications. The LOI must be submitted a minimum of 195 days before the conference begins. b. LOIs must follow the instructions in Part IV, A and be emailed to the program contact(s) below
Application Deadline(s)	a. **2022:** Thursday, August 11, 2022 (5:00 p.m. Eastern Time) b. **Conference Grants:** submitted after LOI decision response and a minimum of 150 days before the conference begins
Grant Duration:	a. 36-48 months for **Standard Grants, Strengthening Standard Grants, and New Investigator Standard Grants** b. Up to 24 months for all **Seed Grants** c. Up to 12 months for **Sabbatical Grants** d. Up to 60 months for **Conference Grants**
Maximum Award Amount(s):	a. Including indirect costs: $650,000 for Standard Grants, Strengthening Standard Grants, and New Investigator **Standard** Grants b. Including indirect costs: $300,000 for all **Seed Grants** c. $50,000 for **Conference and Equipment Grants**
Program Area Priority Contact(s):	a. Dr. Mark Mirando, (202) 445-5575 or mark.mirando@usda.gov b. Dr. Kamilah Grant, kamilah.grant@usda.gov

Program Area Priority:
Cellular, molecular, genomic/genetic or whole-animal aspects of animal reproduction relevant to improving reproductive efficiency or enhancing reproductive management, including mitigating reductions in fertility that are exacerbated by climate change, especially focusing on:

a. Gonadal function (including production, function, and preservation of gametes);
b. Hypothalamic-pituitary axis;
c. Embryonic and fetal development (including interaction between the conceptus and its uterine environment); or
d. Microbiome of the reproductive tract.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Projects focusing on species and commodities that are important to underserved farmers and ranchers or small- or medium-sized farms or ranches are encouraged.
c. Applications to study effects of nutritional plane on reproductive performance are appropriate for this program area priority (A1211).
d. Applications to study effects of nutritional plane during gestation on subsequent growth performance or lactation of the offspring should be submitted to the Animal Nutrition, Growth and Lactation program area priority (A1231).

e. Applications to study effects of nutritional plane during gestation on immune function or susceptibility to disease of the dam or offspring should be submitted to the Diseases of Agricultural Animals program area priority (A1221).

2b. Animal Nutrition, Growth and Lactation

Table 11: Animal Nutrition, Growth and Lactation Key Information

Title	Description
Program Code:	A1231
Program Code Name:	Animal Nutrition, Growth and Lactation
CFDA Number	10.310
Project Type(s):	Research Projects only
Grant Type(s):	a. Standard, Conference, and FASE (Strengthening Standard, New Investigator, Strengthening Conference, Seed, Equipment, and Sabbatical) Grants b. See *Part II § C.2* for requirements specific to conference and FASE Grant applications.
Letter of Intent Deadline	a. Required only for **Conference Grant** applications. The LOI must be submitted a minimum of 195 days before the conference begins. b. LOIs must follow the instructions in Part IV, A and be emailed to the program contact(s) below
Application Deadline(s)	a. **2022:** Thursday, August 11, 2022 (5:00 p.m. Eastern Time) b. **Conference Grants:** submitted after LOI decision response and a minimum of 150 days before the conference begins
Grant Duration:	a. 36-60 months for **Standard Grants, Strengthening Standard Grants, and New Investigator Standard Grants** b. Up to 24 months for all **Seed Grants** c. Up to 12 months for **Sabbatical Grants** d. Up to 60 months for **Conference Grants**
Maximum Award Amount(s):	a. Including indirect costs: $650,000 for **Standard Grants, Strengthening Standard Grants, and New Investigator Standard Grants** b. Including indirect costs: $300,000 for all **Seed Grants** c. $50,000 for **Conference and Equipment Grants**
Program Area Priority Contact(s):	a. Dr. Steven Smith, steven.i.smith@usda.gov b. Dr. Mark Mirando, (202) 445-5575 or mark.mirando@usda.gov

Program Area Priority:

Cellular, molecular, genomic/genetic or whole-animal aspects of nutrition, growth and lactation, especially focusing on:

a. Nutrient utilization and efficiency, including influence and impact of the gastrointestinal microbiome, especially mitigation of enteric methane and other greenhouse gases;
b. Innovative approaches to feed formulation or use of novel alternative feedstuffs, especially those that may contribute to reducing emission of methane and other greenhouse gases;
c. Improving the quality and efficiency of producing meat, milk, eggs, fish, and animal fiber; or
d. Metabolic disorders and nutritional deficiencies affecting production of meat, milk, eggs, fish, and animal fiber.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Projects focusing on species and commodities that are important to underserved farmers and ranchers or small- or medium-sized farms or ranches are encouraged.
c. Applications focused on the effects of metabolic disorders (e.g., hepatic lipidosis, ketosis, post-parturient hypocalcemia, displaced abomasum, insulin resistance) and nutrient deficiencies on meat, milk and egg production are appropriate for this program area priority (A1231). Applications focused on the effects of metabolic disorders and nutrient deficiencies on immune function or susceptibility to disease should be submitted to the Diseases of Agricultural Animals program area priority (A1221).
d. Applications to study effects of nutritional plane during gestation on subsequent growth performance or lactation of the offspring are appropriate for this program area priority (A1231). Applications focused on effects of nutritional plane on reproductive performance should be submitted to the Animal Reproduction program area priority (A1211). Applications to study effects of nutritional plane during gestation on immune function or susceptibility to disease of the dam or offspring should be submitted to the Diseases of Agricultural Animals program area priority (A1221).
e. Projects addressing precision animal management, such as resource-smart feeding and monitoring, should consider the Inter-Disciplinary Engagement in Animal Systems (IDEAS) program area priority (A1261 in Crosscutting Programs).
f. Applications to study effects of pre-harvest treatments (e.g., nutritional plane) on post-harvest product characteristics are appropriate for this program area priority (A1231). Applications focused exclusively on post-harvest treatments and their effect on our understanding of the chemical, physical, and biological properties of animal products or methods to improve the safety, quality, shelf-life, convenience, nutrient profile or sensory attributes of animal products, should be submitted to the Novel Foods and Innovative Manufacturing Technologies program area priority (A1364). Applications focused exclusively on post-harvest treatments intended to enhance the nutritional value of animal products through improved bioavailability of vitamins, minerals, and bioactive components should be submitted to the Food and Human Health program area priority (A1343).
g. NIFA is partnering with Ireland and Northern Ireland under the U.S.-Ireland Research and Development Partnership to solicit collaborative research applications in the Animal Nutrition, Growth and Lactation program area priority. For more information including FAQs about this program, visit the NIFA, Ireland, and Northern Ireland partnership page. Applicants submitting to this partnership must select Collaborative as the grant type and their application title should begin as "TRIPARTITE: [full title]".

2c. Welfare of Agricultural Animals

Table 12: Welfare of Agricultural Animals Key Information

Title	Description
Program Code:	A1251
Program Code Name:	Welfare of Agricultural Animals
CFDA Number	10.310
Project Type(s):	Research or Integrated Projects only
Grant Type(s):	a. Standard, Conference, and FASE (Strengthening Standard, New Investigator, Strengthening Conference, Seed, Equipment, and Sabbatical) Grants b. See *Part II § C.2* for requirements specific to conference and FASE Grant applications.
Letter of Intent Deadline	a. Required only for **Conference Grant** applications. The LOI must be submitted a minimum of 195 days before the conference begins. b. LOIs must follow the instructions in Part IV, A and be emailed to the program contact(s) below
Application Deadline(s)	a. **2022:** Thursday, August 11, 2022 (5:00 p.m. Eastern Time) b. **Conference Grants:** submitted after LOI decision response and a minimum of 150 days before the conference begins
Grant Duration:	a. 36-60 months for **Standard Grants, Strengthening Standard Grants, and New Investigator Standard Grants** b. Up to 24 months for all **Seed Grants** c. Up to 12 months for **Sabbatical Grants** d. Up to 60 months for **Conference Grants**
Maximum Award Amount(s):	a. Including indirect costs: $650,000 for **Standard Grants, Strengthening Standard Grants, and New Investigator Standard Grants**; $800,000 with specific partnerships (see *Part II § E*) b. Including indirect costs: $300,000 for all **Seed Grants** c. $50,000 for **Conference and Equipment Grants**
Program Area Priority Contact(s):	a. Dr. Frank Siewerdt, (816) 329-9745 or frank.siewerdt@usda.gov b. Dr. Mark Mirando, (202) 445-5575 or mark.mirando@usda.gov

Program Area Priority:

Evaluation (which should include assessment of animal welfare) of current animal agriculture (including aquaculture) production practices and/or development of new or enhanced management approaches that safeguard both animal welfare and sustainable production efficiency, including but not limited to:

a. Advance objective measures of animal welfare, including the use of emerging methods and metrics for assessment (e.g., functional genomics; epidemiology; automated, noninvasive methods) for outcome based (health and behavior) welfare assessment criteria.
b. Alternatives or improvements for painful management procedures; euthanasia and slaughter methods to decrease pain and distress; handling and transportation to decrease injury and distress (including thermal stress);

c. Understanding the effect of the microbiome on animal welfare;
d. Selection for robustness, behavior, and/or social effects; or
e. Development of innovative alternatives to replace or reduce the use of animals in agricultural research.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Projects focusing on species and commodities that are important to underserved farmers and ranchers or small- or medium-sized farms or ranches are encouraged.
c. Projects with specific types of partnerships (small and mid-sized or minority-serving degree-granting institutions not on the list of most successful institutions; EPSCoR institutions; or international partners) have the opportunity to request up to an additional $150,000 as specified in the key information table. See *Part II § E* for detailed eligibility restrictions.
d. NIFA is partnering with Ireland and Northern Ireland under the U.S.-Ireland Research and Development Partnership to solicit collaborative research applications in the Welfare of Agricultural Animals program area priority. For more information including FAQs about this program, visit the NIFA, Ireland, and Northern Ireland partnership page. Applicants submitting to this partnership must select Collaborative as the grant type and their application title should begin as "TRIPARTITE: [full title]". **Note: Research applications submitted for U.S.-Ireland Tripartite Collaborative grants are ineligible for U.S. funding above the research program maximum of $650,000.**
e. Applications that address social science aspects of animal welfare or those that focus on precision animal management of animal welfare should be submitted to the Inter-Disciplinary Engagement in Animal Sciences program area priority (A1261).
f. Applications that address animal welfare with a significant engineering component such as the design, manufacture, and operation of structures, technologies, machines, processes, and/or systems should be submitted to the Agriculture Systems and Technology program area priority: Engineering for Agricultural Production and Processing (A1521).
g. Applications that address animal welfare, but work exclusively on prevention, control, or treatment of animal diseases, should be submitted to the Diseases of Agricultural Animals program area priority (A1221).

2d. Diseases of Agricultural Animals

Table 13: Diseases of Agricultural Animals Key Information

Title	Description
Program Code:	A1221
Program Code Name:	Diseases of Agricultural Animals
CFDA Number	10.310
Project Type(s):	Research Projects only
Grant Type(s):	a. Standard, Conference, and FASE (Strengthening Standard, New Investigator, Strengthening Conference, Seed, Equipment, and Sabbatical) Grants b. See *Part II § C.2* for requirements specific to conference and FASE Grant applications.
Letter of Intent Deadline	a. Required only for **Conference Grant** applications. The LOI must be submitted a minimum of 195 days before the conference begins. b. LOIs must follow the instructions in Part IV, A and be emailed to the program contact(s) below
Application Deadline(s)	a. **2022:** Thursday, August 11, 2022 (5:00 p.m. Eastern Time) b. **Conference Grants:** submitted after LOI decision response and a minimum of 150 days before the conference begins
Grant Duration:	a. 36-60 months for **Standard Grants, Strengthening Standard Grants, and New Investigator Standard Grants** b. Up to 24 months for all **Seed Grants** c. Up to 12 months for **Sabbatical Grants** d. Up to 60 months for **Conference Grants**
Maximum Award Amount(s):	a. Including indirect costs: $650,000 for **Standard Grants, Strengthening Standard Grants, and New Investigator Standard Grants**; $800,000 with specific partnerships (see *Part II § E*) b. Including indirect costs: $300,000 for all **Seed Grants** c. $50,000 for **Conference and Equipment Grants**
Program Area Priority Contact(s):	a. Dr. Tim Sullivan, (816) 527-5434 or timothy.sullivan@usda.gov b. Dr. Kathe Bjork, (816) 591-7415 or kathe.e.bjork@usda.gov

Program Area Priority:

Application topics may include, but are not limited to, one or more of the following:

a. Cellular, molecular, genomic/genetic or whole-animal aspects of animal health and disease, with emphasis on maintaining healthy agricultural animals to ensure a safe and adequate food supply.
b. Maintenance of homeostasis including innate immune responses.
c. Disease prevention and control, **including** vaccines; reverse vaccinology; breeding for resistance; management, and diagnostics.
   NOTE: Diagnostics for transboundary/foreign and emerging/re-emerging diseases should be submitted to the Agricultural Biosecurity program area priority (A1181). For all diagnostic tests, applicants must provide a validation plan.;
d. Therapeutic interventions for disease reduction or treatment, including minor use animal

drugs.

e. Immune Reagents for Agricultural Animals. Development of publicly-accessible, reasonably-priced immunological reagents for Ruminants, Swine, Equine, Aquaculture (major focus on catfish and salmonids) or Poultry. Reagents should be applicable to the study of more than one disease and fill gaps where research is hindered due to a lack of critical reagents. Clearly outline how you will connect with stakeholders and partners to determine the U.S. immunology communities' highest priority needs.
   1) The application title should be: "IMMUNE REAGENTS for {commodity}: Lead Institution Name".
   2) Proposals **MUST** describe a strong management and implementation plan that guarantees sustainability and avoids loss of developed reagents.

f. Establishment of a "Research Coordination Network for Minor Use Drugs" to advance the timely approval of priority animal health products for minor species of food- and fiber-producing animals, and for minor uses in major animal species (excluding companion animals).
   1) The proposal should be titled: "RCN MINOR USE DRUGS: Project Director's First and Last name"; example title = "RCN MINOR USE DRUGS: Joseph Smith".
   2) The budget should be divided among 5 years. Projects **MUST** address (1) linkages among research institutions, drug manufacturer(s) and the FDA-Center for Veterinary Medicine and other relevant government or private agencies as needed, (2) outreach and communication, (3) selection and prioritization of drug approval needs, (4) sustainability and future funding, and (5) a management plan.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Projects focusing on species and commodities that are important to underserved farmers and ranchers or small- or medium-sized farms or ranches are encouraged.
c. Projects with specific types of partnerships (small and mid-sized or minority-serving degree-granting institutions not on the list of most successful institutions; EPSCoR institutions; or international partners) have the opportunity to request up to an additional $150,000 as specified in the key information table. See *Part II § E* for detailed eligibility restrictions.
d. Research that addresses animal health and disease (including zoonotic or vector-borne animal disease) with potential for adaptation to climate change is encouraged.
e. NIFA is partnering with Ireland and Northern Ireland under the U.S.-Ireland Research and Development Partnership to solicit collaborative research applications in the Diseases of Agricultural Animals program area priority. For more information including FAQs about this program, visit the NIFA, Ireland, and Northern Ireland partnership page. Applicants submitting to this partnership must select Collaborative as the grant type and their application title should begin as "TRIPARTITE: [full title]". **Note: Research applications submitted for U.S.-Ireland Tripartite Collaborative grants are ineligible for U.S. funding above the research program maximum of $650,000.**
f. Applications to study effects of nutritional plane during gestation on immune function or susceptibility to disease of the dam or offspring are appropriate for this program area priority (A1221).

g. Applications focused on the effects of metabolic disorders (e.g., hepatic lipidosis, ketosis, post-parturient hypocalcemia, displaced abomasum, insulin resistance) and nutrient deficiencies on immune function or susceptibility to disease are appropriate for this program area priority (A1221). Applications focused on the effects of metabolic disorders and nutrient deficiencies on meat, milk and egg production should be submitted to the Animal Nutrition, Growth and Lactation program area priority (A1231).

2e. Animal Breeding, Genetics, and Genomics

Table 14: Animal Breeding, Genetics, and Genomics Key Information

Title	Description
Program Code:	A1201
Program Code Name:	Animal Breeding, Genetics, and Genomics
CFDA Number	10.310
Project Type(s):	Research Projects only
Grant Type(s):	a. Standard, Conference, and FASE (Strengthening Standard, New Investigator, Strengthening Conference, Seed, Equipment, and Sabbatical) Grants b. See *Part II § C.2* for requirements specific to conference and FASE Grant applications.
Letter of Intent Deadline	a. Required only for **Conference Grant** applications. The LOI must be submitted a minimum of 195 days before the conference begins. b. LOIs must follow the instructions in Part IV, A and be emailed to the program contact(s) below
Application Deadline(s)	a. **2022:** Thursday, August 11, 2022 (5:00 p.m. Eastern Time) b. **Conference Grants:** submitted after LOI decision response and a minimum of 150 days before the conference begins
Grant Duration:	a. 36-60 months for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants** b. 36-48 months for **USDA Animal Genome Blueprint projects** c. Up to 24 months for all **Seed Grants** d. Up to 12 months for **Sabbatical Grants** e. Up to 60 months for **Conference Grants**
Maximum Award Amount(s):	a. Including indirect costs: $650,000 for **Standard Grants, Strengthening Standard Grants and Standard New Investigator Grants**; $800,000 with specific partnerships (see *Part II § E*) b. Including indirect costs: $1,300,000 for **USDA Animal Genome Blueprint projects** c. Including indirect costs: $300,000 for all **Seed Grants** d. $50,000 for **Conference and Equipment Grants**
Program Area Priority Contact(s):	a. Dr. Frank Siewerdt, (816) 329-9745 or frank.siewerdt@usda.gov b. Dr. Angelica Van Goor, (816) 584-5304 or angelica.van.goor@usda.gov

Program Area Priority:

a. Animal genomics research priorities over the next decade were identified from stakeholder inputs and were compiled in the report. "Genome to Phenome: Improving Animal Health, Production, and Well-Being: A new USDA Blueprint for Animal Genome Research 2018 – 2027" in *Frontier in Genetics*. Some of the research priorities identified in the animal genome blueprint are pan genomes, gene editing, germplasm conservation, functional annotation of animal genomes, precision breeding, high throughput phenotyping, and big data. Proposals that align with the animal genome blueprint goals are highly encouraged to submit to this program area or other program areas within the RFA based on the best alignment with program area priority goals. Novel quantitative genetic methods including selection theory and modeling; implementing selection methods that use a systems approach using a combination of genomics, epigenomics, functional genomics, and microbiome data for simultaneous improvement of multiple traits.
b. Development of national and regional breeding strategies to address biotic and abiotic stresses (including climate and/or environmental extremes), greenhouse gas emissions from livestock, genetic diversity, germplasm storage and characterization, crossbreeding or genome modifications.
c. Development of new phenotypes for improving selection criteria and/or development of high-throughput methods for on-farm recording of traits.

USDA Animal Genome Blueprint Target Areas:

a. Genome-wide catalog of functional elements in both coding and non-coding regions of the genome, epigenomics, and chromatin architecture with emphasis on development and application of high-throughput methods in multiple individuals and across diverse breeds.
b. Genome Design using functional genetic or epigenetic variants underlying traits of interest for traditional selection or as candidates for gene editing.
c. Development and application of comparative genomics approaches for genetic mapping of traits and understanding the evolution of traits of interest to commercial agriculture.
d. Development of gene editing methods for high-throughput functional screening of candidate loci in cells, tissues or organoid systems.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Projects focusing on species and commodities that are important to underserved farmers and ranchers or small- or medium-sized farms or ranches are encouraged.
c. Projects with specific types of partnerships (small and mid-sized or minority-serving degree-granting institutions not on the list of most successful institutions; EPSCoR institutions; or international partners) have the opportunity to request up to an additional $150,000 as specified in the key information table. See *Part II § E* for detailed eligibility restrictions.
d. NIFA is partnering with Ireland and Northern Ireland under the U.S.-Ireland Research and Development Partnership to solicit collaborative research applications in the Animal Breeding, Genetics, and Genomics program area priority. For more information including FAQs about this program, visit the NIFA, Ireland, and Northern Ireland partnership page.

Applicants submitting to this partnership must select Collaborative as the grant type and their application title should begin as "TRIPARTITE: [full title]". **Note: Research applications submitted for U.S.-Ireland Tripartite Collaborative grants are ineligible for U.S. funding above the research program maximum of $650,000; USDA Animal Genome Blueprint projects are not eligible for tripartite funding.**

e. Applications proposing data science projects that leverage data sets across multiple disciplines and convert large amounts of data into knowledge and applications through computer analytics, modeling and simulations should submit applications to the DSFAS program area priority (A1541 in Crosscutting Programs).
f. Applications that propose to use functional genomics and genome editing approaches for understanding animal health or production traits should be submitted to respective program area priorities (A1211 for Animal Reproduction; A1221 for Diseases of Agricultural Animals; A1231 for Animal Nutrition, Growth and Lactation; or A1251 for Welfare of Agricultural Animals).
g. Applications focused on conventional/classical animal breeding, breed development, or applied quantitative genetics for one or multiple traits are appropriate to this program A1201 (e.g., selecting within a breed for a specific trait of interest).
h. Projects should demonstrate strong community support and coordination with domestic and international partners, commodity groups and/or consortia.

3. Food Safety, Nutrition, and Health

Background

Safe, high quality, and nutritious foods are essential for human health and well-being, and their production is critical to the domestic and global competitiveness of American agricultural products, fostering consumer trust and the long-term sustainability of the U.S. agricultural industries. Our nation's population is more diverse than ever and consumers continue to demand foods that are nutritious and safe, including those that are local and regionally produced, and those that have not been common in the typical American diet. Consumer interest in novel foods has risen, and to address this need, industry is responding with novel technologies for engineering, manufacturing, packaging, and delivery of foods and food ingredients. Implementation strategies to address obesity and related chronic diseases include increasing physical activity, improving fruit and vegetable consumption, and strengthening communities with behaviors and policies that encourage healthy lifestyles. As the nation's food systems become more global, vertically integrated and specialized, the use of data science approaches and advanced analytics will be critical to safeguard foods from intentional or accidental contamination. The Food Safety, Nutrition, and Health program area seeks to provide the scientific foundation for addressing public demands for safe, accessible and nutritious foods, using a transdisciplinary approach, and to define previously unrealized opportunities for improving food safety, quality and nutrition along the value chain.

Total Program Funds – Approximately **$39** million

Program Area Key Information applicable to <u>ALL</u> Food Safety, Nutrition, and Health Program Area Priories:

a. All applications must adhere to the requirements in *Part IV*.

b. Applications from and collaborations with minority-serving institutions, small to mid-sized institutions, and/or institutions within the EPSCoR states are welcome in this program area.
c. Applications that include collaborations with international partners may also be submitted. The AFRI International Partnerships webpage contains additional information on international partnerships.
d. Use of trans-disciplinary teams, including social and behavioral scientists and economists, is encouraged, where appropriate.
e. Applications with highly complex, large scale, transdisciplinary, and integrated research, education, and extension projects that incorporate foundational knowledge from this program area should be submitted to the AFRI Sustainable Agricultural Systems program (A9201) described in the AFRI SAS RFA.
f. An applicant may submit a Conference Grant application anytime during the year. A Letter of Intent (LOI) is required for Conference Grant applications. The LOI must be submitted at least 195 days before the start of the conference. The full Conference Grant application must be submitted, at minimum, 150 days before the start of the conference.

Program Area Priorities – Each application must address at least one of the five program area priorities listed below. Details about each of the Food Safety, Nutrition, and Health program area priorities are provided later in this section.

3a. Food Safety and Defense
3b. Novel Foods and Innovative Manufacturing Technologies
3c. Diet, Nutrition and the Prevention of Chronic Diseases
3d. Food and Human Health
3e. Mitigating Antimicrobial Resistance across the Food Chain

3a. Food Safety and Defense

Table 15: Food Safety and Defense Key Information

Title	Description
Program Code:	A1332
Program Code Name:	Food Safety and Defense
CFDA Number	10.310
Project Type(s):	Research Projects only
Grant Type(s):	a. Standard, Conference, and FASE (Strengthening Standard, New Investigator, Strengthening Conference, Seed, Equipment, and Sabbatical) Grants only b. See *Part II § C.2* for requirements specific to conference and FASE Grant applications.
Letter of Intent Deadline	a. Required only for **Conference Grant** applications. The LOI must be submitted a minimum of 195 days before the conference begins. b. LOIs must follow the instructions in Part IV, A and be emailed to the program contact(s) below
Application Deadline(s)	a. **2022**: Thursday, August 25, 2022 (5:00 p.m. Eastern Time) b. **Conference Grants**: submitted after LOI decision response and a minimum of 150 days before the conference begins

Title	Description
Grant Duration:	a. 36-60 months for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants** b. Up to 24 months for all **Seed Grants** c. Up to 12 months for **Sabbatical Grants** d. Up to 60 months for **Conference Grants**
Maximum Award Amount(s):	a. Including indirect costs: $650,000 for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants**; $800,000 with specific partnerships (see *Part II § E*) b. Including indirect costs: $300,000 for all **Seed Grants** c. $50,000 for **Conference and Equipment Grants**
Program Area Priority Contact(s):	a. Dr. J. Mark Carter, (816) 820-9533 or mark.carter@usda.gov b. Dr. Hongda Chen, (202) 445-5582 or hongda.chen@usda.gov

Program Area Priority:
NIFA requests proposals for basic and applied research that will reduce the risk of intentional or unintentional contamination of foods.

Applications must address one or more of the following (order does not indicate importance):

a. Develop microbiological methods for enumerating enteric pathogens, specifically *Salmonella*, *Campylobacter*, and STEC, in large representative food samples designed to represent a food production lot;
b. Develop microbiological procedures designed to alleviate the need for enrichment in the detection of very small numbers of pathogens in large food samples collected to represent a food production lot;
c. Develop methods for identifying, detecting, and/or enumerating pathogens of relatively high public health risk or virulence;
d. Develop and validate advanced and innovative technologies or processes for food processing, manufacturing, packaging, cleaning, and sanitation to effectively reduce the presence of surviving enteric pathogens, including in low moisture foods and processing facilities;
e. Develop preharvest or postharvest methods to detect, reduce, and/or mitigate allergens, physical hazards, or toxic chemicals in foods, such as arsenic, lead, cadmium, mercury, PFAS, or emerging chemicals of concern for human diet;
f. Develop methods to identify, prevent, or reduce intentional contamination or adulteration of foods; or
g. Develop and validate novel strategies for the effective control of persistent reservoirs of foodborne pathogens

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. The project narrative must include discussion and justification of the foodborne contaminants to be studied as a food safety threat.
c. The project narratives should include a discussion of how key economic, consumer, or

regulatory issues will affect the ultimate utility and impact of the proposed research.

d. Studies on emerging pathogens or underfunded hazards, such as *Listeria monocytogenes*, are encouraged.
e. Control strategies may include plant or animal breeding to improve food safety.
f. Projects with specific types of partnerships (small and mid-sized or minority-serving degree-granting institutions not on the list of most successful institutions; EPSCoR institutions; or international partners) have the opportunity to request up to an additional $150,000 as specified in the key information table. See *Part II § E* for detailed eligibility restrictions.
g. Applications addressing antimicrobial resistance should be submitted to the Mitigating Antimicrobial Resistance across the Food Chain program area priority (A1366).
h. Projects focused on Nano-based sensing mechanisms and smart sensors for accurate, reliable and cost-effective early and rapid detection of pathogens, allergens, chemicals and contaminants in foods, plant and animal production systems, water and soil and the agricultural production environment should be submitted to the Nanotechnology for Agricultural and Food systems program area priority (A1511).
i. Applications to develop or improve advanced data analytical methods or tools for utilizing the emerging science of big data to aid food traceability, safety, quality and nutrition decision making should be submitted to the Data Science for Food and Agricultural Systems (DSFAS) program area priority (A1541 in Crosscutting Programs).

3b. Novel Foods and Innovative Manufacturing Technologies

Table 16: Novel Foods and Innovative Manufacturing Technologies Key Information

Title	Description
Program Code:	A1364
Program Code Name:	Novel Foods and Innovative Manufacturing Technologies
CFDA Number	10.310
Project Type(s):	Research Projects only
Grant Type(s):	a. Standard, Conference, and FASE (Strengthening Standard, New Investigator, Strengthening Conference, Seed, Equipment, and Sabbatical) Grants only b. See *Part II § C.2* for requirements specific to conference and FASE Grant applications.
Letter of Intent Deadline	a. Required only for **Conference Grant** applications. The LOI must be submitted a minimum of 195 days before the conference begins. b. LOIs must follow the instructions in Part IV, A and be emailed to the program contact(s) below
Application Deadline(s)	a. **2022:** Thursday, September 1, 2022 (5:00 p.m. Eastern Time) b. **Conference Grants:** submitted after LOI decision response and a minimum of 150 days before the conference begins
Grant Duration:	a. 36-60 months for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants** b. Up to 24 months for all **Seed Grants** c. Up to 12 months for **Sabbatical Grants** d. Up to 60 months for **Conference Grants**

Title	Description
Maximum Award Amount(s):	a. Including indirect costs: $650,000 for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants**; $800,000 with specific partnerships (see *Part II § E*) b. Including indirect costs: $300,000 for all **Seed Grants** c. $50,000 for **Conference and Equipment Grants**
Program Area Priority Contact(s):	a. Dr. Hongda Chen, (202) 445-5582 or hongda.chen@usda.gov b. Dr. J. Mark Carter, (816) 820-9533 or mark.carter@usda.gov

Program Area Priority:
NIFA requests proposals for research that develop risk-based approaches to ensure the quality, safety and nutrition of novel foods and food ingredients, including products from pulses. This priority area also seeks to advance food manufacturing competitiveness to ensure a more sustainable, resilient and healthy food supply.

Applications must address one or more of the following (order does not indicate importance):

a. Improve knowledge and understanding of the chemical, physical, and biological properties of novel foods and food ingredients;
b. Improve the safety, quality, shelf-life, convenience, nutrient profile or sensory attributes of novel foods and food ingredients;
c. Develop innovative manufacturing technologies that increase productivity, improve food quality and/or nutritional value of foods and food ingredients that are more energy, water and resource efficient; or
d. Advance sciences and develop technologies to improve shelf life and minimize food waste and loss throughout the food supply chain including consumer empowering tools.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Projects focusing on species and commodities that are important to underserved farmers and ranchers or small- or medium-sized farms or ranches are encouraged.
c. Novel foods considered for this priority are those foods or food ingredients that can be newly developed, produced or preserved using new technologies or processes.
d. Advanced food manufacturing encompasses engineering, processing technologies, packaging, cleaning and sanitation, robotics, high-speed automation, artificial intelligence, machine learning, data science, nanotechnology, sensors, and quality/safety inspections of food and food products.
e. Projects with specific types of partnerships (small and mid-sized or minority-serving degree-granting institutions not on the list of most successful institutions; EPSCoR institutions; or international partners) have the opportunity to request up to an additional $150,000 as specified in the key information table. See *Part II § E* for detailed eligibility restrictions.
f. Applications with a primary interest in data science, artificial intelligence, machine learning, or integrated or research Coordinated Innovation Networks (CIN) for advanced

food manufacturing should be submitted to the Data Science for Food and Agricultural Systems (DSFAS) program area priority (A1541 in Crosscutting Programs).

g. Proposed research with a primary focus on improving food safety should be submitted to Food Safety and Defense program (A1332).
h. Research on plant production and breeding to improve food quality and nutritional traits should consider submitting to one of the program area priorities in the Plant Health and Production and Plant Products area.

3c. Diet, Nutrition and the Prevention of Chronic Diseases

Table 17: Diet, Nutrition and the Prevention of Chronic Diseases Key Information

Title	Description
Program Code:	A1344
Program Code Name:	Diet, Nutrition and the Prevention of Chronic Diseases
CFDA Number	10.310
Project Type(s):	a. Integrated Projects only b. Research, Education, Extension, or Integrated Projects allowed for **Seed Grants** only
Grant Type(s):	a. Standard, Conference, and FASE (Strengthening Standard, New Investigator, Strengthening Conference, Seed, Equipment, and Sabbatical) Grants only b. See *Part II § C.2* for requirements specific to conference and FASE Grant applications.
Letter of Intent Deadline	a. Required only for **Conference Grant** applications. The LOI must be submitted a minimum of 195 days before the conference begins. b. LOIs must follow the instructions in Part IV, A and be emailed to the program contact(s) below
Application Deadline(s)	a. **2022:** Thursday, August 25, 2022 (5:00 p.m. Eastern Time) b. **Conference Grants:** submitted after LOI decision response and a minimum of 150 days before the conference begins
Grant Duration:	a. 36-60 months for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants** b. Up to 24 months for all **Seed Grants** c. Up to 12 months for **Sabbatical Grants** d. Up to 60 months for **Conference Grants**
Maximum Award Amount(s):	a. Including indirect costs: $1,000,000 for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants**; $1,150,000 with specific partnerships (see *Part II § E*) b. Including indirect costs: $300,000 for all **Seed Grants** c. $50,000 for **Conference and Equipment Grants**
Program Area Priority Contact(s):	a. Dr. Mallory Koenings, (202) 604-1985 or mallory.koenings@usda.gov b. Dr. Lisa Jahns, (816) 820-9584 or lisa.jahns@usda.gov

Program Area Priority:

NIFA requests proposals for integrated projects that help prevent and control chronic disease. Applicants must address at least one of the following:

a. Develop, implement, and evaluate innovative research, educational, and outreach strategies to improve eating patterns that prevent and control diet-related chronic diseases;
b. Investigate, assess, and recommend food and nutrition research and program interventions with the goal to achieve nutrition security, improve and sustain health; or
c. Improve food security and nutritional health outcomes for racial/ethnic minority populations, underserved populations, rural, or remote populations through an evidence-based approach to healthy eating and active living.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Projects must reflect understanding of the multifaceted and interactive nature of research, education, and extension-outreach.
c. Projects must also reflect knowledge of having consistent access, availability, and affordability of foods and beverages that promote well-being and prevent (and if needed control) disease, particularly among racial/ethnic minority populations, underserved populations, and rural, or remote populations.
d. Projects that in addition to helping prevent and control chronic disease also address critical current and future effects of climate change on food systems will also be considered.
e. Projects with specific types of partnerships (small and mid-sized or minority-serving degree-granting institutions not on the list of most successful institutions; EPSCoR institutions; or international partners) have the opportunity to request up to an additional $150,000 as specified in the key information table. See *Part II § E* for detailed eligibility restrictions.

3d. Food and Human Health

Table 18: Food and Human Health Key Information

Title	Description
Program Code:	A1343
Program Code Name:	Food and Human Health
CFDA Number	10.310
Project Type(s):	Research Projects only
Grant Type(s):	a. Standard, Conference, and FASE (Strengthening Standard, New Investigator, Strengthening Conference, Seed, Equipment, and Sabbatical) Grants only b. See *Part II § C.2* for requirements specific to conference and FASE Grant applications.
Letter of Intent Deadline	a. Required only for **Conference Grant** applications. The LOI must be submitted a minimum of 195 days before the conference begins. b. LOIs must follow the instructions in Part IV, A and be emailed to the program contact(s) below

Title	Description
Application Deadline(s)	a. **2022:** Thursday, September 1, 2022 (5:00 p.m. Eastern Time) b. **Conference Grants:** submitted after LOI decision response and a minimum of 150 days before the conference begins
Grant Duration:	a. 36-60 months for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants** b. Up to 24 months for all **Seed Grants** c. Up to 12 months for **Sabbatical Grants** d. Up to 60 months for **Conference Grants**
Maximum Award Amount(s):	a. Including indirect costs: $650,000 for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants**; $800,000 with specific partnerships (see *Part II § E*) b. Including indirect costs: $300,000 for all **Seed Grants** c. $50,000 for **Conference and Equipment Grants**
Program Area Priority Contact(s):	a. Dr. Lisa Jahns, (816) 820-9584 or lisa.jahns@usda.gov b. Dr. Lydia Kaume, (816) 642-4607 or lydia.kaume@usda.gov

Program Area Priority:
NIFA requests proposals that investigates the nutrients and contaminants in food and their impact on the gut microbiota in an effort to improve human health.

Applicants must address at least one of the following:

a. Enhance the nutritional value of foods through improved bioavailability of vitamins, minerals, and bioactive components and improved absorption of vitamins, minerals, and bioactive components including nanoscale delivery;
b. Investigate the multi-directional impact of food composition and structure (including micro- and nano-structures) on human gut health (i.e., nutrient absorption rates, secondary metabolites, pathogen interaction, physiological indications, sensory signaling, etc.) to assess the safety, quality, and nutritional value of foods; and/or
c. Investigate the role of the food components or contaminants on the human gut microbiome and its metabolites, and the subsequent impact on human health.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Justification must be provided for the relationship of the bioactive component(s) being studied to human health outcomes and/or the health of the human gut microbiome.
c. Priority will be given to applications that use a whole food approach or that address health effects of a combination of two or more bioactive components found in food. The whole food approach may also be one that adds enrichment, fortification or micro- and nano-encapsulation to enhance bioavailability of bioactive components in food.
d. This program area priority does not support research on the development of dietary supplements, research on dietary therapies for existing disease, or for the establishment, expansion, or maintenance of dietary databases.
e. Projects with specific types of partnerships (small and mid-sized or minority-serving degree-granting institutions not on the list of most successful institutions; EPSCoR

institutions; or international partners) have the opportunity to request up to an additional $150,000 as specified in the key information table. See *Part II § E* for detailed eligibility restrictions.

3e. Mitigating Antimicrobial Resistance Across the Food Chain

Table 19: Mitigating Antimicrobial Resistance Across the Food Chain Key Information

Title	Description
Program Code:	A1366
Program Code Name:	Mitigating Antimicrobial Resistance Across the Food Chain
CFDA Number	10.310
Project Type(s):	a. Integrated Projects only b. Research, Education, Extension, or Integrated Projects allowed for **Seed Grants** only
Grant Type(s):	a. Standard, Conference, and FASE (Strengthening Standard, New Investigator, Strengthening Conference, Seed, Equipment, and Sabbatical) Grants only b. See *Part II § C.2* for requirements specific to conference and FASE Grant applications.
Letter of Intent Deadline	a. Required only for **Conference Grant** applications. The LOI must be submitted a minimum of 195 days before the conference begins. b. LOIs must follow the instructions in Part IV, A and be emailed to the program contact(s) below
Application Deadline(s)	a. **2022:** Thursday, September 1, 2022 (5:00 p.m. Eastern Time) b. **Conference Grants:** submitted after LOI decision response and a minimum of 150 days before the conference begins
Grant Duration:	a. Up to 60 months for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants** b. Up to 24 months for all **Seed Grants** c. Up to 12 months for **Sabbatical Grants** d. Up to 60 months for **Conference Grants**
Maximum Award Amount(s):	a. Including indirect costs: $1,000,000 for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants** b. Including indirect costs: $300,000 for all **Seed Grants** c. $50,000 for **Conference and Equipment Grants**
Program Area Priority Contact(s):	a. Dr. J. Mark Carter, (816) 820-9533 or mark.carter@usda.gov b. Dr. Kathe Bjork, (816) 591-7415 or kathe.e.bjork@usda.gov

Program Area Priority:

Innovative solutions to the complex problem of AMR in food and agriculture are most effectively addressed by inter-disciplinary teams of experts using a systems approach. This systems-based integrated program will empower inter-disciplinary teams to develop, refine, and disseminate science-based knowledge about food and agricultural management and production practices that can mitigate or reduce the risk of antimicrobial resistance along the food chain. Approaches can span AMR knowledge gaps to include but not limited to stewardship and behavioral changes in food and agriculture. The goal is to ensure safe, nutritious and abundant

food supply while conserving and protecting responsible use of antimicrobials across the food and agriculture domain.

Applications must address at least one of the following:

a. Describe, quantify and assess the risk to human health from the presence of AMR pathogens or genes persisting at various critical control points along the food chain from production through processing to retail, and human consumption;
b. Investigate and assess important factors, such as fitness and virulence associated with foodborne AMR pathogens that contribute to AMR development and persistence leading to foodborne illness;
c. Identify risk associated with antimicrobial use in food animals or crops, AMR development, and public health;
d. Assess AMR in food and agriculture: challenges for small-scale or historically underserved producers; and/or
e. Determine improved best management practices and approaches in antibiotic stewardship and trusted resources for communicating and dispensing antibiotic stewardship information and guidance.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Applicants interested in identifying international collaborators or partnerships for the AMR program may refer to the Joint Programming Initiative on Antimicrobial Resistance supported projects website.
c. While development of vaccines that prevent certain diseases can be one way to decrease antimicrobial resistance, the AMR program does not support research on the development of vaccines for controlling animal diseases. Applications that address vaccine development for animal diseases should be submitted to the Diseases of Agricultural Animals program area priority (A1221).
d. NIFA is partnering with Ireland and Northern Ireland under the U.S.-Ireland Research and Development Partnership to solicit collaborative research applications in the Mitigating Antimicrobial Resistance Across the Food Chain program area priority. For more information including FAQs about this program, visit the NIFA, Ireland, and Northern Ireland partnership page. Applicants submitting to this partnership must select Collaborative as the grant type and their application title should begin as "TRIPARTITE: [full title]".

4. Bioenergy, Natural Resources, and Environment

Background

The Bioenergy, Natural Resources, and Environment (BNRE) program area supports foundational and applied research and integrated projects to promote, improve, and maintain healthy agroecosystems and the natural resources that are essential to the sustained long-term production of agricultural and forestry goods and services. BNRE addresses national priorities including efforts to advance the bioeconomy and help farms and ranches, forests, and rangelands adapt to climate change.

Sustainable management of forest and agroecosystems requires the maintenance of the supporting natural resources and ecosystem services. Ecosystem services, defined as the benefits people obtain from ecosystems, fall into four categories of supporting services, provisioning services, regulating services and cultural services, with examples that include genetic resources; water quality; air quality; pollinator, wildlife and fisheries habitats; carbon sequestration; nutrient cycling and recreation.

Development and deployment of sustainable forest and agroecological practices require an understanding of the interactions among physical, chemical, biological, socioeconomic, and human factors and their response to natural and anthropogenic changes. Science-based information that integrates these complex interactions is needed to make decisions that support sustainable expansion of forest and agricultural production while maintaining associated natural resources and ecosystem services and promote resilience-based strategies to avoid critical thresholds of irreversible damage or loss. At the same time, applications to this program area must develop approaches that will contribute to the quantifiable reduction of the overall footprint of agriculture.

USDA-supported agricultural and forest biomass production systems provide raw biomass for transformation into interchangeable feedstock to produce biopower, biofuels, chemicals, and other biobased products. These systems must be integrated into existing agricultural landscapes in ways that enhance or do not degrade the natural resource base or other production systems. Research, development, and outreach to producers, processors, consumers, and the public are needed to build a portfolio of agricultural and natural resource research and technologies integrated with sustainable biomass systems.

In addition to the program area priorities described in this section, the **BNRE** program area also supports the following program area priorities described in Crosscutting Programs:

a. Interdisciplinary Engagement in Animal Systems (A1261)
b. Extension, Education & USDA Climate Hubs Partnership (A1721).

Total Program Funds – Approximately **$33** million

Program Area Key Information applicable to <u>ALL</u> Bioenergy, Natural Resources and Environment priority areas:

a. All applications must adhere to the requirements in *Part IV*.
b. Applications from and collaborations with minority-serving institutions, small to mid-sized institutions, and/or institutions within the EPSCoR states are welcome in this program area.
c. All applications should justify the choice of the systems under study in terms of importance to sustainability and conservation of agroecosystems.
d. Projects with available long-term research data are encouraged to partner with research programs and institutions with existing networks such as the USDA Long-Term Agroecosystem Research Network (LTAR), NSF Long Term Ecological Research (LTER), USDA Forest Service Experimental Forests and Ranges, USDA Forest Service Forest Inventory and Analysis, USDA National Agricultural Library Ag Data Commons,

USDA Climate Hubs, or others.

e. Applications may include international collaboration that will help achieve U.S. program objectives. Applicants are welcome to identify potential foreign collaborators using their own networks or contacts, or utilize partnerships that NIFA has developed (see the AFRI International Partnerships webpage).
f. Projects focused on data integration for decision making such as organizing and managing large data sets that include sustainability factors, and their interactions to assess risk, valuation of biodiversity and ecosystem services for landscape planning, and management or to make key policy and on farm decisions are encouraged to include reference sources from the Millennium Ecosystem Assessment, LTAR/LTER databanks, USDA Climate Hubs, and/or the USDA Life Cycle Assessment (LCA) Digital Commons.
g. Where appropriate, projects may focus on developing and assessing adaptation strategies for efficient and faster responses to changing climate and other unforeseen natural or man-made events that affect forestry, agriculture and food production.
h. The BNRE program area invites applications for conferences and workshops that consider the three pillars of sustainability and interactions among the components. An applicant may submit a Conference Grant application anytime during the year. A Letter of Intent (LOI) is required for Conference Grant applications. The LOI must be submitted at least 195 days before the start of the conference. The full Conference Grant application must be submitted, at minimum, 150 days before the start of the conference.
i. Applications with highly complex, large scale, transdisciplinary, and integrated research, education, and extension projects that incorporate foundational knowledge from this program area should be submitted to the AFRI Sustainable Agricultural Systems program (A9201) described in the AFRI SAS RFA.

Program Area Priorities – Each application must address at least one of the four program area priorities listed below. Details about each of the BNRE program area priorities are provided later in this section.

4a. Soil Health
4b. Water Quantity and Quality
4c. Sustainable Bioeconomy through Biobased Products
4d. Sustainable Agroecosystems: Health, Functions, Processes and Management

4a. Soil Health

Table 20: Soil Health Key Information

Title	Description
Program Code:	A1401
Program Code Name:	Soil Health
CFDA Number	10.310
Project Type(s):	Research Projects only

Title	Description
Grant Type(s):	a. Standard, Conference, and FASE (Strengthening Standard, New Investigator, Strengthening Conference, Seed, Equipment, and Sabbatical) Grants only b. See *Part II § C.2* for requirements specific to conference and FASE Grant applications.
Letter of Intent Deadline	a. Required only for **Conference Grant** applications. The LOI must be submitted a minimum of 195 days before the conference begins. b. LOIs must follow the instructions in Part IV, A and be emailed to the program contact(s) below
Application Deadline(s)	a. **2022:** Thursday, September 1, 2022 (5:00 p.m. Eastern Time) b. **Conference Grants:** submitted after LOI decision response and a minimum of 150 days before the conference begins
Grant Duration:	a. 36-48 months f for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants** b. Up to 24 months for all **Seed Grants** c. Up to 12 months for **Sabbatical Grants** d. Up to 60 months for **Conference Grants**
Maximum Award Amount(s):	a. Including indirect costs: $750,000 for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants**; $900,000 with specific partnerships (see *Part II § E*) b. Including indirect costs: $300,000 for all **Seed Grants** c. $50,000 for **Conference and Equipment Grants**
Program Area Priority Contact(s):	a. Dr. Sandeep Kumar, (816) 832-7235 or sandeep.kumar@usda.gov b. Dr. Diomides Zamora (202) 590-6049 or diomides.zamora@usda.gov

Program Area Priority:
Healthy soils function as a living system and sustain plant and animal productivity while maintaining or enhancing water and air quality and promoting plant, animal and human health. Soils are the foundation of a healthy ecosystem and, hence, it is imperative to improve our understanding of the physical and biogeochemical interactions and processes within and between the soil and the environment. This will lead to the development of tools, practices, techniques and/or innovations for sequestering soil carbon, improving soil health and the resilience and sustainability of agricultural production systems and ecosystem services. Practices include soil-based enhancement of nutrient and water efficiencies, carbon sequestration, reduced inputs, and a reduction in chemicals of environmental concern. Practices based on indigenous traditional ecological knowledge are appropriate for this program area priority. The goal of the Soil Health program area priority is to support research projects that will contribute to:

a. foundational and applied research to advance scientific understanding of soil physical and biogeochemical processes and interactions;
b. the assessment, development and adoption of models, decision support tools and new management/conservation practices and/or processes that will lead to improving or maintaining soil health and productivity while maintaining or improving environmental health and sustainability of our natural resource base;

c. a focus on the interactions between the social and human dimensions with environmental and economic dimensions is encouraged. Proposed projects that are primarily fundamental science must explain how a better understanding of the fundamental processes will lead to strategies to improve overall soil health and the resilience and sustainability of agricultural production systems and ecosystem services.

Applications may address one or more of the following (order does not indicate importance):

a. Evaluation of the effects of management practices on soil microbial community's function and their contribution to healthy soils, carbon sequestration, and/or sustainable agroecosystems; or
b. Assessment and/or development of innovative and/or appropriate (in the environmental, cultural and economic context) approaches, practices, techniques, tools and technologies that enhance the understanding and/or management of the physical and biogeochemical processes that contribute to soil health and agricultural resilience and sustainability. Examples of these tools and practices include cover crops, agroforestry, and other soil conservation practices.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Please refer to the USDA Soil Health Technical Note No. NRCS-2018-0006 for recommended soil health indicators and associated laboratory procedures.
c. Projects with specific types of partnerships (small and mid-sized or minority-serving degree-granting institutions not on the list of most successful institutions; EPSCoR institutions; or international partners) have the opportunity to request up to an additional $150,000 as specified in the key information table. See *Part II § E* for detailed eligibility restrictions.
d. Applications that investigate how changes to cropping systems affect crop performance, soil health and other outcomes beneficial to system resilience should apply to the Foundational Knowledge of Agricultural Production Systems program area (A1102).
e. Applications that involve the interactions between the host, environment, and microbiome with the end-goal of improving and sustaining agricultural productivity and quality in plant systems and associated natural resources should apply to the Agricultural Microbiomes in Plant Systems and Natural Resources program area priority (A1402 in Crosscutting Programs). Research projects interested in only soil microbiomes should apply to the Soil Health program area priority (A1401).
f. Applications focused on the development of soil sensors and/or innovative manufacturing processes of sensors for measuring key physical, chemical, and biological components across time and space should consider the Signals in the Soil (SitS) program from the National Science Foundation, jointly administered by NIFA and NSF.
g. Applications that will synthesize or analyze existing data and resources on soil health (e.g., microbiome data, soil health indicators, soil metrics, etc.) should apply to the Data Science for Food and Agricultural Systems (DSFAS) program area priority (A1541 in Crosscutting Programs).

4b. Water Quantity and Quality

Table 21: Water Quantity and Quality Key Information

Title	Description
Program Code:	A1411
Program Code Name:	Water Quantity and Quality
CFDA Number	10.310
Project Type(s):	Research Projects only
Grant Type(s):	a. Standard, Conference, and FASE (Strengthening Standard, New Investigator, Strengthening Conference, Seed, Equipment, and Sabbatical) Grants only b. See *Part II § C.2* for requirements specific to conference and FASE Grant applications.
Letter of Intent Deadline	a. Required only for **Conference Grant** applications. The LOI must be submitted a minimum of 195 days before the conference begins. b. LOIs must follow the instructions in Part IV, A and be emailed to the program contact(s) below
Application Deadline(s)	a. **2022:** Thursday, September 1, 2022 (5:00 p.m. Eastern Time) b. **Conference Grants:** submitted after LOI decision response and a minimum of 150 days before the conference begins
Grant Duration:	a. 36-48 months for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants** b. Up to 24 months for all **Seed Grants** c. Up to 12 months for **Sabbatical Grants** d. Up to 60 months for **Conference Grants**
Maximum Award Amount(s):	a. Including indirect costs: $750,000 for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants**; $900,000 with specific partnerships (see *Part II § E*) b. Including indirect costs: $300,000 for all **Seed Grants** c. $50,000 for **Conference and Equipment Grants**
Program Area Priority Contact(s):	Dr. James Dobrowolski, (202) 420-8918 or james.dobrowolski@usda.gov

Program Area Priority:
The U.S. is committed to the proper management of agricultural practices and improved efficiency of agricultural water use to protect water quality and increase water and food security (U.S. Global Water Strategy, 2017). USDA-NIFA will provide competitive support to improve water science, management and technologies, water conservation and water use efficiency; promote common data exchange formats and access to data for decision-making, improve forecasting and model water related systems. Practically, USDA-NIFA seeks applications to:

a. reduce the freshwater demand (both groundwater and surface water) for irrigation and the nutrient demand for maximum crop production by substituting the use of other technologies, management practices and/or other water sources (recycled wastewater, brackish groundwater, agricultural return flow and produced water from industry) while retaining appropriate soil health (managed salinity, adequate infiltration) and eliminating accelerated erosion from farm fields and

b. improve nutrient management and reduce nutrient load to surface or groundwater.

Applications **MUST** address at least one of the following:

a. Reduction of the use of freshwater and improve agricultural resilience/sustainability by innovative approaches, tools and technologies.
b. Evaluation of the physical and biogeochemical interactions, fluxes, fate and transport, transformation, and storage of single or multiple nutrients, pathogens or constituents of environmental concern (CEC) of a variety of sources as it relates to agroecosystem productivity and on associated natural resources and environment. Applications to this priority should include: 1) Predictive and/or hindcasting tools to assess control technologies to mitigate excess nutrient, pathogens, and/or CEC movement; or 2) Improve process-based models to analyze nutrient, and/or CEC life cycles in agroecosystems, rangelands, grasslands and forests.
c. Mitigation of soil salinity from the use of lower quality water sources in agriculture through: 1) The application of novel technologies involving plants, animals, soil and/or water; and 2) Improve our knowledge of the benefits and costs of treating water sources for irrigation of crops and other water uses in agriculture.
d. Conservation of surface and groundwater quantity through research of agroecosystems. How do we ensure the right crop in the right place with the right water (e.g., availability of nontraditional water sources)? What are the key farming decisions that improve water use under irrigation (e.g., whole farm multipliers, legacy effects and providing a step-change in farm management that manages variable climate risks)?
e. Mitigation and/or measurement of soil erodibility and erosion to sustain agroecosystems. Given the demand for greater agricultural production to 2050 coupled with a reduced water footprint, what are the key elements to conserve our natural resource base while farming more marginal landscapes?

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Projects with specific types of partnerships (small and mid-sized or minority-serving degree-granting institutions not on the list of most successful institutions; EPSCoR institutions; or international partners) have the opportunity to request up to an additional $150,000 as specified in the key information table. See *Part II § E* for detailed eligibility restrictions.
c. Applications focused on engineering technologies and tools for water and nutrient management should consider applying to the Engineering for Precision Crop and Water Management program area priority (A1551).
d. Applications involving the development of nanotechnology solutions should consider applying to the Nanotechnology for Agriculture and Food Systems program area priority (A1511).

4c. Sustainable Bioeconomy through Biobased Products

Table 22: Sustainable Bioeconomy through Biobased Products Key Information

Title	Description
Program Code:	A1414

Title	Description
Program Code Name:	Sustainable Bioeconomy through Biobased Products
CFDA Number	10.310
Project Type(s):	Integrated (research, and education and/or extension) Projects only
Grant Type(s):	a. Standard, Conference, and FASE (Strengthening Standard, New Investigator, Strengthening Conference, Seed, Equipment, and Sabbatical) Grants only b. See *Part II § C.2* for requirements specific to conference and FASE Grant applications.
Letter of Intent Deadline	a. Required only for **Conference Grant** applications. The LOI must be submitted a minimum of 195 days before the conference begins. b. LOIs must follow the instructions in Part IV, A and be emailed to the program contact(s) below
Application Deadline(s)	a. **2022:** Thursday, September 1, 2022 (5:00 p.m. Eastern Time) b. **Conference Grants:** submitted after LOI decision response and a minimum of 150 days before the conference begins
Grant Duration:	a. Up to 48 months for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants** b. Up to 24 months for all **Seed Grants** c. Up to 12 months for **Sabbatical Grants** d. Up to 60 months for **Conference Grants**
Maximum Award Amount(s):	a. Including indirect costs: ~~$1,00,000~~ $1,000,000 for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants** b. Including indirect costs: $300,000 for all **Seed Grants** c. $50,000 for **Conference and Equipment Grants**
Program Area Priority Contact(s):	a. ~~Dr. Toby Aherns, toby.aherns@usda.gov~~ a. Dr. Toby Ahrens, toby.ahrens@usda.gov b. Dr. Victoria Finkenstadt, (816)520-8456 or victoria.finkenstadt@usda.gov

Program Area Priority:
This program area priority focuses on developing biomass systems, and producing biobased products or biomass generated power to enable the bioeconomy, and in a manner, which reduces adverse impacts to the environment. The sustainable bioeconomy encompasses the development of bio-based products that promote human health, economic prosperity, energy security, ecosystem resources, and mitigation of climate change. The development of bio-based products can complement existing agricultural production systems and industrialized processes by creating opportunities to improve overall system profitability and productivity. Projects should address one or more of the following (order does not indicate importance):

a. New and/or improved strategies to develop bio-based products that improve product functionality, increase potential revenues and/or reduce cost over incumbent products; this includes addressing supply chain challenges for the production systems for feedstock/germplasm improvement, product formulation or end-user market demand;
b. Strategies and approaches for scalable biomass systems that provide beneficial ecosystem services, such as carbon sequestration, improved water availability and quality, improved

life cycle emissions, nutrient use reduction, or wildlife and pollinator habitat enhancements; and

c. Strategies to alleviate technical, and economic barriers leading to adoption resulting in improved consumer attitudes toward the bioeconomy and strengthening the rural economy through development of new bioproducts and employment opportunities.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Applicants should identify and partner with industry, government, communities and non-government organizations critical for system deployment.
c. NIFA is partnering with Ireland and Northern Ireland under the U.S.-Ireland Research and Development Partnership to solicit collaborative research applications in the Sustainable Bioeconomy through Biobased Products program area priority. For more information including FAQs about this program, visit the NIFA, Ireland, and Northern Ireland partnership page. Applicants submitting to this partnership must select Collaborative as the grant type and their application title should begin as "TRIPARTITE: [full title]".

4d. Sustainable Agroecosystems: Health, Functions, Processes and Management

Table 23: Sustainable Agroecosystems: Health, Functions, Processes and Management Key Information

Title	Description
Program Code:	A1451
Program Code Name:	Sustainable Agroecosystems: Health, Functions, Processes and Management
CFDA Number	10.310
Project Type(s):	Research Projects only
Grant Type(s):	a. Standard, Conference, and FASE (Strengthening Standard, New Investigator, Strengthening Conference, Seed, Equipment, and Sabbatical) Grants only b. See *Part II § C.2* for requirements specific to conference and FASE Grant applications.
Letter of Intent Deadline	a. Required only for **Conference Grant** applications. The LOI must be submitted a minimum of 195 days before the conference begins. b. LOIs must follow the instructions in Part IV, A and be emailed to the program contact(s) below
Application Deadline(s)	a. **2022:** Thursday, September 15, 2022 (5:00 p.m. Eastern Time) b. **Conference Grants:** submitted after LOI decision response and a minimum of 150 days before the conference begins
Grant Duration:	a. 36-48 months for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants** b. Up to 24 months for all **Seed Grants** c. Up to 12 months for **Sabbatical Grants** d. Up to 60 months for **Conference Grants**

Title	Description
Maximum Award Amount(s):	a. Including indirect costs: $650,000 for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants**; $800,000 with specific partnerships (see *Part II § E*) b. Including indirect costs: $300,000 for all **Seed Grants** c. $50,000 for **Conference and Equipment Grants**
Program Area Priority Contact(s):	a. Dr. Amy Ganguli, (816) 642-0813 or amy.ganguli@usda.gov b. Dr. Diomides Zamora (202) 590-6049 or diomides.zamora@usda.gov c. Dr. Adam Wilke, (816) 398-5277 or adam.wilke@usda.gov

Program Area Priority:
This program area priority calls for research projects that focus on improvement of ecosystem health and productivity in managed systems (croplands, forests, grasslands and rangelands) that are currently under stress and at risk from climate change, pests, pathogens, invasive plants, and increased environmental pressures. This priority area calls for research projects that will lead to foundational or applied research to advance scientific understanding of processes and interactions in managed systems, and/or the assessment and development of new management or conservation practices with a focus on ecosystem services and resilience-based strategies. The project should lead to substantial improvements in ecosystem services in extensively managed and agricultural systems by addressing the impacts of changes in management practices on croplands, forest, grasslands, and rangelands at local and landscape scales. Applicants may focus on the interactions between the social and human dimensions with environmental and economic dimensions. Proposed projects that are primarily fundamental science must explain how a better understanding of the fundamental processes will help sustain ecosystem services, improve resilience, or help inform actions to achieve improved efficiencies and diminished negative impacts on natural resources. Applications using indigenous traditional ecological knowledge are appropriate for this program area priority.

To enable development and evaluation of innovative management practices and novel systems to maintain or improve productivity while enhancing ecosystem services, applications **must** address one of the following:

a. Connection of ecosystem health to production system functionality, resilience, productivity, socioeconomic viability, sustainability, biodiversity and the production of other ecosystem services; or
b. New approaches that significantly increase ecosystem health and resilience, particularly in response to climate change, along with the output or value of more than one ecosystem service, each compared with the current management system for the region.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Projects with specific types of partnerships (small and mid-sized or minority-serving degree-granting institutions not on the list of most successful institutions; EPSCoR institutions; or international partners) have the opportunity to request up to an additional

$150,000 as specified in the key information table. See *Part II § E* for detailed eligibility restrictions.

c. NIFA is partnering with Ireland and Northern Ireland under the U.S.-Ireland Research and Development Partnership to solicit collaborative research applications in the Sustainable Agroecosystems: Health, Functions, Processes and Management program area priority. For more information including FAQs about this program, visit the NIFA, Ireland, and Northern Ireland partnership page. Applicants submitting to this partnership must select Collaborative as the grant type and their application title should begin as "TRIPARTITE: [full title]". **Note: Research applications submitted for U.S.-Ireland Tripartite Collaborative grants are ineligible for U.S. funding above the research program maximum of $650,000.**
d. Applications primarily focused on dynamics among or within management components of a production system that limit crop productivity, quality, or profitability may be more appropriate for the Foundational Knowledge of Agricultural Production Systems Program Area Priority (A1102).

5. Agriculture Systems and Technology

Background

The Agriculture Systems and Technology (AST) program area emphasizes the interrelationships between agricultural systems components to develop the next generation of engineered systems, products, processes, and technologies. AST blends biological, physical, and social sciences, thus, leading to sustainable, competitive, and innovative solutions for United States and global agriculture and food systems, encompassing both conventional and organic production. To the extent possible, applicants are encouraged to incorporate interdisciplinary sciences. By doing so, projects are more likely to incorporate varying dimensions of sustainability (economic, environmental, and social) and have a greater impact on agricultural problems. The broad list of topics encompassed by this program area includes, but is not limited to, new uses and products from traditional and nontraditional crops, animals, mixed animal and plant production systems, byproducts, and natural resources; robotics, automation, precision and geospatial technologies, energy efficiency, computing, and expert systems; new hazard and risk assessment and mitigation measures; and water quality, irrigation, and management. Projects focusing on species and commodities that are important to underserved farmers or ranchers or small- or medium-sized farms or ranches are encouraged.

Total Program Funds – Approximately **$29** million

Program Area Key Information applicable to ALL Agriculture Systems and Technology priority areas:

a. All applications must adhere to the requirements in *Part IV*.
b. Applications from, and collaborations with, minority-serving institutions, small to mid-sized institutions, and/or institutions within the EPSCoR states are welcome in this program area.
c. Applications that include collaborations with international partners may also be submitted. The AFRI International Partnerships webpage contains additional information on international partnerships.

d. While this program area encourages conference grant applications on any topic related to the program area priorities below, this program area is particularly interested in conference or workshop applications that bring together stakeholders, researchers, extension specialists, educators, and technology providers to:
   1) Create a roadmap for developing and delivering the next generation of agricultural technologies, including but not limited to precision agriculture, cyber-physical systems, information management, and nanotechnology. These technologies should be smarter, more user-friendly, and readily adaptable to a wide variety of crops and producers (including small-scale or limited-resource) and their unique needs (with little modification) in support of sustainable production practices and systems; or
   2) Advance the understanding and application of transformative systems approaches to enhance agricultural and food system sustainability. By "transformative systems" we mean those that offer major and synergistic advances toward the multiple goals of sustainability—productivity, profitability, environmental, and social dimensions. A conference or workshop should bring together state-of-the-art knowledge on how to identify and assess transformative systems, advance the science involved, and produce a summary of its conclusions for publication and other distribution. This program area encourages applicants to draw from knowledge of systems science and transformational change in fields outside of agriculture including the social and policy sciences, law, and humanities, but with a focus on their application to agricultural and food systems.
e. Applicants must describe the potential of the proposed work to support or achieve substantial gains in efficiencies of production; the probability that the application of technology will resolve constraints or result in positive impacts; and potential outcomes in terms of expected social and environmental benefits of research (see *Part I, B*). Both transformative and incremental solutions are encouraged.
f. Applicants also are encouraged to consider the National Robotics Initiative, Cyber-Physical Systems, and the joint effort between NSF and NIFA in Data for Agriculture (DatAg) whose proposals could be considered under the Cyber-Physical Systems interagency program.
g. Applications with highly complex, large scale, transdisciplinary, and integrated research, education, and extension projects that incorporate foundational knowledge from this program area should be submitted to the AFRI Sustainable Agricultural Systems program (A9201) described in the AFRI SAS RFA.
h. An applicant may submit a Conference Grant application anytime during the year. A Letter of Intent (LOI) is required for Conference Grant applications. The LOI must be submitted at least 195 days before the start of the conference. The full Conference Grant application must be submitted, at minimum, 150 days before the start of the conference.

Program Area Priorities – Each application must address at least one of the four program area priorities listed below. Details about each of the AST program area priorities are provided later in this section.

5a. Engineering for Agricultural Production and Processing
5b. Biorefining and Biomanufacturing
5c. Nanotechnology for Agricultural and Food Systems
5d. Engineering for Precision Crop and Water Management

5a. Engineering for Agricultural Production and Processing

Table 24: Engineering for Agricultural Production and Processing Key Information

Title	Description
Program Code:	A1521
Program Code Name:	Engineering for Agricultural Production and Processing
CFDA Number	10.310
Project Type(s):	Research Projects or Integrated (research, and education and/or extension) Projects only
Grant Type(s):	a. Standard, Conference, and FASE (Strengthening Standard, New Investigator, Strengthening Conference, Seed, Equipment, and Sabbatical) Grants only b. See *Part II § C.2* for requirements specific to conference and FASE Grant applications.
Letter of Intent Deadline	a. Required only for **Conference Grant** applications. The LOI must be submitted a minimum of 195 days before the conference begins. b. LOIs must follow the instructions in Part IV, A and be emailed to the program contact(s) below
Application Deadline(s)	a. **2022:** Thursday, October 6, 2022 (5:00 p.m. Eastern Time) b. **Conference Grants:** submitted after LOI decision response and a minimum of 150 days before the conference begins
Grant Duration:	a. 36-48 months for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants** b. Up to 24 months for all **Seed Grants** c. Up to 12 months for **Sabbatical Grants** d. Up to 60 months for **Conference Grants**
Maximum Award Amount(s):	a. Including indirect costs: $650,000 for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants**; $800,000 with specific partnerships (see *Part II § E*) b. Including indirect costs: $300,000 for all **Seed Grants** c. $50,000 for **Conference and Equipment Grants**
Program Area Priority Contact(s):	a. Dr. Steven Thomson, (202) 603-1053 or steven.j.thomson@usda.gov b. Dr. Ganesh Bora, (816) 489-0944 or ganesh.bora@usda.gov

Program Area Priority:

This program area priority focuses on engineered devices, technologies, and tools to improve agriculturally relevant plant, animal, and forestry systems.. This excludes precision crop and water management systems, which are now included in a new program (A1551). See "additional information," part (g.) below. Applications must have a significant engineering component. Engineering is defined as *the application of scientific and mathematical principles to practical ends such as the design, manufacture, and operation of efficient and sustainable structures, technologies, machines, processes, and systems*. Some broad emphasis areas include, but are not limited to:

a. Enable engineering, sensing, computing, modeling, automation, and information systems for: forestry, plant and animal production and protection (including aquaculture); and post-harvest inspection, handling, processing, packaging, and distribution.
b. Develop systems or technology for sensing, automation and mechanization of labor-intensive tasks in crop and animal production (including aquaculture).
c. Technologies for nutrient recovery from manure.
d. Explore the use or development of advanced computational or engineering methods and technologies for navigation, mining, management, visualization, understanding, and communication of agricultural systems data in production and processing systems.
e. Develop and test risk assessment and mitigation measures applicable to agriculture (in particular, reduce hazards to agricultural workers that can include assistive technologies).
f. Within potential topics presented herein, methods of breaking down technological barriers to adoption in **integrated projects** are welcomed.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Projects that expand access of crop and animal production systems with an emphasis on historically underserved farmers and ranchers, where applicable, are encouraged.
c. Projects with specific types of partnerships (small and mid-sized or minority-serving degree-granting institutions not on the list of most successful institutions; EPSCoR institutions; or international partners) have the opportunity to request up to an additional $150,000 as specified in the key information table. See *Part II § E* for detailed eligibility restrictions.
d. Applications that deal with improving food quality, safety, or nutritional value should be submitted to the Food Safety, Nutrition, and Health program area described in this RFA.
e. All applications dealing with nano-scale science and technology should be submitted to the Nanotechnology for Agricultural and Food Systems program area priority (A1511).
f. Research-only project applications that focus on improvement of water use under irrigation and that focus on non-traditional water sources used for irrigation (wastewater, etc.) should consider applying to Water Quantity and Quality program area priority (A1411).
g. Engineering project applications that focus on precision crop and orchard management, technologies for targeted application of crop protection materials, and systems to improve efficiency of irrigation and nutrient use should consider applying for program area priority (A1551).

5b. Biorefining and Biomanufacturing

Table 25: Biorefining and Biomanufacturing Key Information

Title	Description
Program Code:	A1531
Program Code Name:	Biorefining and Biomanufacturing
CFDA Number	10.310
Project Type(s):	Research Projects only

Title	Description
Grant Type(s):	a. Standard, Conference, and FASE (Strengthening Standard, New Investigator, Strengthening Conference, Seed, Equipment, and Sabbatical) Grants only b. See *Part II § C.2* for requirements specific to conference and FASE Grant applications.
Letter of Intent Deadline	a. Required only for **Conference Grant** applications. The LOI must be submitted a minimum of 195 days before the conference begins. b. LOIs must follow the instructions in Part IV, A and be emailed to the program contact(s) below
Application Deadline(s)	a. **2022:** Thursday, ~~September 29~~ October 6, 2022 (5:00 p.m. Eastern Time) b. **Conference Grants:** submitted after LOI decision response and a minimum of 150 days before the conference begins
Grant Duration:	a. 36-48 months for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants** b. Up to 24 months for all **Seed Grants** c. Up to 12 months for **Sabbatical Grants** d. Up to 60 months for **Conference Grants**
Maximum Award Amount(s):	a. Including indirect costs: $650,000 for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants**; $800,000 with specific partnerships (see *Part II § E*) b. Including indirect costs: $300,000 for all **Seed Grants** c. $50,000 for **Conference and Equipment Grants**
Program Area Priority Contact(s):	a. Dr. Victoria Finkenstadt, (816) 520-8456 or victoria.finkenstadt@usda.gov b. Dr. Steven Thomson, (202) 603-1053 or steven.j.thomson@usda.gov c. Dr. Toby Aherns, toby.aherns@usda.gov

Program Area Priority:
A biorefinery is a system that integrates biomass conversion, processes, and equipment to manufacture biofuels, chemicals, and bioproducts. This program area priority focuses on converting, treating, processing, refining, or manufacturing products to utilize plant, animal, and woody biomass. Applications must have a significant engineering component. In the context of this program area priority, engineering is defined as *the application of engineering principles and tools to biological systems or materials to create usable, tangible, economically viable product and manufacturing technology or practices*. Some broad research areas include, but are not limited to:

a. Improve or expand production efficiency and capacity of biomass, biofuels, chemical feedstocks, renewable energy, and bio-based products.
b. Improve or expand utilization of waste and byproducts generated in agricultural and food systems.
c. Engineer new or improved products and processes that utilize materials from agriculture or micro-organisms (including, but are not limited to, bioplastics and biocomposites).

d. Address the long-term sustainability of biorefining or biomanufacturing systems that balance productivity along with positive economic, environmental, and social outcomes including the application of "circular bioeconomy" principles, lifecycle analysis (LCA), and techno-economic assessment (TEA).
e. Identify the socio-economic factors that either constrain or encourage the acceptance of engineered products and biomanufacturing processes in the marketplace.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Projects with specific types of partnerships (small and mid-sized or minority-serving degree-granting institutions not on the list of most successful institutions; EPSCoR institutions; or international partners) have the opportunity to request up to an additional $150,000 as specified in the key information table. See *Part II § E* for detailed eligibility restrictions.
c. NIFA is partnering with Ireland and Northern Ireland under the U.S.-Ireland Research and Development Partnership to solicit collaborative research applications in the Biorefining and Biomanufacturing program area priority. For more information including FAQs about this program, visit the NIFA, Ireland, and Northern Ireland partnership page. Applicants submitting to this partnership must select Collaborative as the grant type and their application title should begin as "TRIPARTITE: [full title]". **Note: Research applications submitted for U.S.-Ireland Tripartite Collaborative grants are ineligible for U.S. funding above the research program maximum of $650,000.**
d. Applications that consider the whole bioeconomy should be submitted to Sustainable Bioeconomy through Biobased Products (A1414).
e. Applications that deal with improving food quality, safety, or nutritional value should be submitted to the Food Safety, Nutrition, and Health program area in this RFA.
f. All applications dealing with nano-scale science and technology should be submitted to the Nanotechnology for Agricultural and Food Systems program area priority (A1511).
g. Applications dealing with improvements to plants for production of bioproducts, including '-omics' approaches should be submitted to the Plant Health and Production and Plant Products program area of this RFA. Microbial approaches can be submitted to this program area priority (A1531).

5c. Nanotechnology for Agricultural and Food Systems

Table 26: Nanotechnology for Agricultural and Food Systems Key Information

Title	Description
Program Code:	A1511
Program Code Name:	Nanotechnology for Agricultural and Food Systems
CFDA Number	10.310
Project Type(s):	Research Projects only

Title	Description
Grant Type(s):	a. Standard, Conference, and FASE (Strengthening Standard, New Investigator, Strengthening Conference, Seed, Equipment, and Sabbatical) Grants only b. See *Part II § C.2* for requirements specific to conference and FASE Grant applications.
Letter of Intent Deadline	a. Required only for **Conference Grant** applications. The LOI must be submitted a minimum of 195 days before the conference begins. b. LOIs must follow the instructions in Part IV, A and be emailed to the program contact(s) below
Application Deadline(s)	a. **2022:** Thursday, August 25, 2022 (5:00 p.m. Eastern Time) b. **Conference Grants:** submitted after LOI decision response and a minimum of 150 days before the conference begins
Grant Duration:	a. 36-48 months for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants** b. Up to 24 months for all **Seed Grants** c. Up to 12 months for **Sabbatical Grants** d. Up to 60 months for **Conference Grants**
Maximum Award Amount(s):	a. Including indirect costs: $650,000 for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants**; $800,000 with specific partnerships (see *Part II § E*) b. Including indirect costs: $300,000 for all **Seed Grants** c. $50,000 for **Conference and Equipment Grants**
Program Area Priority Contact(s):	a. Dr. Hongda Chen, (202)445-5582 or hongda.chen@usda.gov b. Dr. James Dobrowolski, (202) 420-8918 or james.dobrowolski@usda.gov c. Dr. Ganesh Bora, (816) 489-0944 or ganesh.bora@usda.gov d. Dr. J. Mark Carter, (816) 820-9533 or mark.carter@usda.gov

Program Area Priority:
Nanoscale science, engineering, and technology embrace opportunities in a wide range of critical challenges facing agriculture and food systems. The program encourages applications with innovative ideas, connected to hypothesis-based fundamental sciences, to develop nanotechnology-enabled solutions for food and nutrition security and circular economy through the following broad areas: improved productivity and product quality; reduction of food waste/loss; improved nutritional value and efficiency of food and feed products; more effective therapies that significantly impact animal health and wellness; enhanced food safety and biosecurity; increased protection for natural resources, the environment, and agricultural ecosystems; and improved sustainability, health, safety and joy of living. This program area priority includes, but is not limited to:

a. Novel uses and high value-added products of nano-biomaterials from agricultural and forest origins for food and non-food applications. Note: Applications primarily addressing packaging, food contact surfaces, food safety, agrochemicals, environment, health, or other aspects of agriculture and food production will be acceptable, whereas applications addressing how engineered nanomaterials affect nutritional or quality

attributes of food are not solicited in this program.

b. Environmental, health and safety assessments of engineered nanoparticles **used in food and agricultural systems**, including detection and quantification of engineered nanoparticles, characterization of hazards, exposure levels, transport and fate of the engineered nanoparticles or nanomaterials in foods, crops, soils (and soil biota), water, and livestock (including aquaculture species), or to agricultural and allied industry workers. This may also include animal feed formulations and processes that utilize novel nanomaterials or develop new nanostructured materials or nanoparticles that are bio-persistent in digestive pathways.
c. Nanotechnology-enabled smart sensors for accurate, reliable and cost-effective early and rapid detection of pathogens, allergens, insects, diseases, chemical toxins, and contaminants in foods, plant and animal production systems, water, soil and the agricultural production environment. Nanotechnology-enabled portable, field-deployable and affordable sensors and devices for real-time detection and screening to identify agriculturally-important targets requiring no additional laboratory analyses are encouraged.
d. Cost-effective distributed sensing networks, in which the sensors are enabled by nanotechnology, for intelligent and precise application of agricultural inputs (e.g., fertilizer, water, and chemicals) with the Internet of Agricultural Things (i.e., cyber-physical systems) and the science and tools of big data.
e. Nanotechnology-enabled monitoring physiological biomarkers for optimal crop or animal productivity and health.
f. Discovery and characterization of nanoscale phenomena, processes, and structures relevant and important to agriculture and food.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Nanotechnology is defined by the National Nanotechnology Initiative (NNI) as "…the understanding and control of matter at dimensions between approximately 1 and 100 nanometers, where unique phenomena enable applications. Encompassing nanoscale science, engineering and technology, nanotechnology involves imaging, measuring, modeling and manipulating matter at this length scale." Applications should contain a clear statement about how the work proposed uses nanotechnology as defined by the NNI.
c. A proposed study working at the scale of atoms or molecules does not necessarily meet the criteria of nanotechnology. Rather, the work proposed should be based on one or more of the unique phenomena, properties, and processes that occur at the nanoscale and are dimensionally dependent. Materials used and/or proposed to be developed must be either synthetic or biologically-based materials that are engineered to provide novel properties or modified functions due to their controlled assembly or synthesis at the nanoscale.
d. This program area priority encourages novel platforms of nanotechnology in the area of higher order assembled systems that include the exploitation of bio-nano interfaces, hybrid bio-inorganic systems, systems biology, synthetic biology, and additive manufacturing technology.

e. Applications, especially those with potential near-term commercial impact, are encouraged to include socioeconomic analyses of anticipated benefits to agriculture, food, and society and to identify the factors that may contribute to, or hinder, adoption.
f. Projects with specific types of partnerships (small and mid-sized or minority-serving degree-granting institutions not on the list of most successful institutions; EPSCoR institutions; or international partners) have the opportunity to request up to an additional $150,000 as specified in the key information table. See *Part II § E* for detailed eligibility restrictions.
g. Applications dealing with public deliberation, social acceptability, and risk perception, management, and communication about nanotechnology and nano-based food or non-food products by agricultural stakeholders (including consumers), using appropriate social science tools should be submitted to Social Implications of Food and Agricultural Technologies program area priority (A1642).

5d. Engineering for Precision Crop and Water Management

Table 27: Engineering for Precision Crop and Water Management Key Information

Title	Description
Program Code:	A1551
Program Code Name:	Engineering for Precision Crop and Water Management
CFDA Number	10.310
Project Type(s):	Research Projects or Integrated (research, and education and/or extension) Projects only
Grant Type(s):	a. Standard, Conference, and FASE (Strengthening Standard, New Investigator, Strengthening Conference, Seed, Equipment, and Sabbatical) Grants only b. See *Part II § C.2* for requirements specific to conference and FASE Grant applications.
Letter of Intent Deadline	a. Required only for **Conference Grant** applications. The LOI must be submitted a minimum of 195 days before the conference begins. b. LOIs must follow the instructions in Part IV, A and be emailed to the program contact(s) below
Application Deadline(s)	a. **2022:** Thursday, October 6, 2022 (5:00 p.m. Eastern Time) b. **Conference Grants:** submitted after LOI decision response and a minimum of 150 days before the conference begins
Grant Duration:	a. 36-48 months for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants** b. Up to 24 months for all **Seed Grants** c. Up to 12 months for **Sabbatical Grants** d. Up to 60 months for **Conference Grants**
Maximum Award Amount(s):	a. Including indirect costs: $650,000 for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants**; $800,000 with specific partnerships (see *Part II § E*) b. Including indirect costs: $300,000 for all **Seed Grants** c. $50,000 for **Conference and Equipment Grants**

Program Area Priority Contact(s):	a. Dr. Steven Thomson, (202) 603-1053 or steven.j.thomson@usda.gov b. Dr. Ganesh Bora, (816) 489-0944 or ganesh.bora@usda.gov

Program Area Priority:
This program area priority focuses on engineered devices, technologies, sensors, and tools to provide precision crop and orchard management, technologies for targeted application of crop protection materials, and improve efficiency of irrigation and nutrient use in agricultural systems. Applications must have a significant engineering component. Engineering is defined as *the application of scientific and mathematical principles to practical ends such as the design, manufacture, and operation of efficient and sustainable structures, technologies, sensors, machines, processes, and systems*. Some broad emphasis areas include, but are not limited to:

a. Develop and test the implementation of tools and precision technologies for monitoring, measurement, and detection in agricultural systems that may incorporate both drone and unmanned ground vehicle (UGV) technologies.
b. Explore the use or development of advanced computational or engineering methods and technologies for navigation, mining, management, visualization, understanding, and communication of agricultural systems data pertaining to precision water and crop management.
c. Develop and improve precision engineering technologies that prevent disease spread/pathogens and invasive weeds in agricultural systems.
d. Develop systems or technology for sensing, automation and mechanization of labor-intensive tasks in precision crop and water management.
e. Within potential topics presented herein, methods of breaking down technological barriers to adoption in **integrated projects** are welcomed.
f. For **integrated projects** that provide engineering solutions for conservation of energy and water resources in irrigation, emphasis areas (that can be combined) include, but are not limited to:
    1) Packaged irrigation management solutions using smart sensing and model-based decision support systems that can be readily adopted by farmers on both small and large scales;
    2) Variable-rate and deficit irrigation management solutions that provide adaptive prescriptions and consider limitations of the water delivery system;
    3) Innovative sensing and control schemes for furrow irrigation;
    4) Combined water and nutrient management systems;
    5) Micro-irrigation designs and management practices that can be appropriately scaled to site-specific characteristics and end-user capabilities; and/or
    6) Decision support tools into easy-to-use irrigation mobile apps that integrate site-specific weather, sensor, soil, and/or model-based data for decision-making.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Projects that expand access of crop and animal production systems with an emphasis on historically underserved farmers and ranchers, where applicable, are encouraged.
c. Projects with specific types of partnerships (small and mid-sized or minority-serving

degree-granting institutions not on the list of most successful institutions; EPSCoR institutions; or international partners) have the opportunity to request up to an additional $150,000 as specified in the key information table. See *Part II § E* for detailed eligibility restrictions.

d. Applications that deal with improving food quality, safety, or nutritional value should be submitted to the Food Safety, Nutrition, and Health program area described in this RFA.
e. All applications dealing with nano-scale science and technology should be submitted to the Nanotechnology for Agricultural and Food Systems program area priority (A1511).
f. Project applications that involve engineering, sensing, computing, modeling, automation, processing, and information systems for plant and animal systems exclusive of precision crop and water management should be submitted to Engineering for Agricultural Production and Processing (A1521).
g. Research-only project applications that focus on improvement of water use under irrigation and that focus on non-traditional water sources used for irrigation (wastewater, etc.) should consider applying to Water Quantity and Quality (A1411) in the Bioenergy, Natural Resources, and Environment program area.

6. Agriculture Economics and Rural Communities

Background

The Agriculture Economics and Rural Communities (AERC) program area supports rigorous economic and social science research that informs decision making, policy design, and implementation to enhance the sustainability of agricultural production systems and natural resources, promote rural economic development and prosperity, enhance quality of life, and alleviate poverty. Topical issues include, but are not limited to, examining agricultural markets and international trade; social implications of food and agricultural technology; commodity policy, crop insurance, and policy design and impact; market structure and performance in the food system and value chain; interactions between agriculture and the environment; rural economic development and well-being; nutrition security; consumer preferences, behavior and market development; and decision-making under uncertainty. An important topic for this RFA is the effects of COVID-19, especially on domestic and international markets, food supply chain, farmers and ranchers, youth and rural communities. The AERC program area supports social and behavioral science disciplines. Interdisciplinary efforts involving social, biophysical, and natural science disciplines are also invited.

Total Program Funds: Approximately **$34** million for each review cycle

Program Area Key Information applicable to ALL Agriculture Economics and Rural Communities Program Area Priorities:

a. All applications must adhere to the requirements in *Part IV*.
b. Applications from, and collaborations with, small to mid-sized institutions, minority-serving institutions, and/or institutions within the EPSCoR states are welcome in this program area.
c. Applications that include collaborations with international partners may also be submitted. The AFRI International Partnerships webpage contains additional information on international partnerships.

d. Applications must include a section providing a justification for the system studied relevant to improving economic, social, and environmental sustainability of agriculture or rural communities.
e. Applications that propose to develop, test, and/or apply decision-support aids or tools are welcome.
f. This program area funds the study of entrepreneurship and business development, but it will not fund the development of new business start-ups or the research and development of new technologies and tools for specific businesses to use. The NIFA Small Business Innovation Research (SBIR) program will entertain applications for new technologies and business development.
g. Applications with highly complex, large scale, transdisciplinary, and integrated research, education, and extension projects that incorporate foundational knowledge from this program area should be submitted to the AFRI Sustainable Agricultural Systems program (A9201) described in the AFRI SAS RFA.
h. An applicant may submit a Conference Grant application anytime during the year. A Letter of Intent (LOI) is required for Conference Grant applications. The LOI must be submitted at least 195 days before the start of the conference. The full Conference Grant application must be submitted, at minimum, 150 days before the start of the conference.

Program Area Priorities – Each application must address at least one of the four program area priorities listed below. Details about each of the AERC program areas are provided later in this section.

6a. Small and Medium-sized Farms
6b. Economics, Markets and Trade
6c. Social Implications of Food and Agricultural Technologies
6d. Rural Economic Development
6e. Environmental and Natural Resource Economics

6a. Small and Medium-Sized Farms

Table 28: Small and Medium-Sized Farms Key Information

Title	Description
Program Code:	A1601
Program Code Name:	Small and Medium-Sized Farms
CFDA Number	10.310
Project Type(s):	Research Projects or Integrated (research with education and/or extension) Projects only
Grant Type(s):	a. Standard, Conference, and FASE (Strengthening Standard, New Investigator, Strengthening Conference, Seed, Equipment, and Sabbatical) Grants only b. See *Part II § C.2* for requirements specific to conference and FASE Grant applications.
Letter of Intent Deadline	a. Required only for **Conference Grant** applications. The LOI must be submitted a minimum of 195 days before the conference begins. b. LOIs must follow the instructions in Part IV, A and be emailed to the program contact(s) below

Title	Description
Application Deadline(s)	a. **2022:** Thursday, September 22, 2022 (5:00 p.m. Eastern Time) b. **Conference Grants:** submitted after LOI decision response and a minimum of 150 days before the conference begins
Grant Duration:	a. 36-60 months for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants** b. Up to 24 months for all **Seed Grants** c. Up to 12 months for **Sabbatical Grants** d. Up to 60 months for **Conference Grants**
Maximum Award Amount(s):	a. Including indirect costs: $650,000 for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants** b. Including indirect costs: $300,000 for all **Seed Grants** c. $50,000 for **Conference and Equipment Grants**
Program Area Priority Contact(s):	Dr. Denis Ebodaghe, (202) 445-5460 or denis.ebodaghe@usda.gov

Program Area Priority:
This program area priority focuses on the development and/or adoption of new models to assist agricultural (farm, forest, or ranch) landowner/manager decision making with respect to appropriate scale management strategies and technologies to enhance economic efficiency and sustainability, including the viability and competitiveness of small and medium-sized dairy, poultry, livestock, crop, forestry, aquaculture, and other operations. The scope of this program area priority includes, but is not limited to projects that:

a. Advance the production, profitability and post-harvest handling of specialty crops including high value-niche market crops such as hemp (if approved in your state), medicinal, aromatic, and essential oils.
b. Develop effective strategies to aid in the development of research, education and extension/outreach programs to meet the needs of underserved small and medium-sized farmers and ranchers.
c. Examine the impacts of COVID-19 on small farm profitability, especially related to new costs related to direct delivery models, new markets and changing demand.
d. Identify and develop affordable small farm appropriate digital agriculture tools that improve production, labor management and farm profitability.
e. Outreach efforts that create opportunities for entry and farm viability for young, beginning, historically disadvantaged, veteran, or immigrant farmers and ranchers. Such efforts should address issues such as farm succession, transition, entry, and profitability through tools that ensure that the next generation of small and medium-sized farmers has access to the information and resources they need to operate their farms on a sustainable and profitable basis.
f. Examine the varying forms of land tenure, including issues related to heir property, especially among aging and beginning farmers, and identify the opportunities and obstacles to land access and land transfer for younger farmers.
g. The feasibility of small to mid-scale processing for fresh fruits and vegetables, frozen fruits and vegetables, value added processing for institutional buyers, or small-scale meat processing. Such efforts could also include direct to consumer markets.
h. Develop effective strategies and tools to assist small and medium-sized forest/woodland

owners in managing and sustaining their timberland.

i. Research and develop effective strategies and tools to assist small and medium-sized farmers in making decisions about participating in livestock (including aquaculture) or crop production contracts.
j. Research and develop effective strategies to aid in the development of efficient local and regional food systems.
k. Evaluate and implement strategies to enhance access to markets by small and medium-sized farms.
l. Research and outreach efforts that develop new tools to ensure that the next generation of small and medium-sized farmers have access to the information and resources they need to operate their farms on a sustainable and profitable basis.
m. Examine the challenges of small and medium-sized farms to increase profitability, sustain farming as a livelihood, and transition to the next generation. Efforts could address issues such as production diversification and sustainability; barriers to markets and effects of social media; farmer savings behavior, financial decision-making and retirement; farm family resource allocation; and intrafamily succession.
n. Develop strategies to address climate change with climate smart agriculture, food and forestry solutions including, but not limited to conservation, reducing greenhouse gas emissions, and other environmental concerns.
o. Projects that expand access on crop and animal production systems with an emphasis on historically underserved farmers where applicable are encouraged.
p. Projects using indigenous traditional ecological knowledge are appropriate for this program area priority.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Applicants must address the Program Area Priority with a Research Project or an Integrated Project that integrates research with extension and/or education (NOTE: Refer to *Part II § C* and *Part III § A* for Integrated Project definitions and eligibility information).

6b. Economics, Markets and Trade

Table 29: Economics, Markets and Trade Key Information

Title	Description
Program Code:	A1641
Program Code Name:	Economics, Markets and Trade
CFDA Number	10.310
Project Type(s):	Research Projects only
Grant Type(s):	a. Standard, Conference, and FASE (Strengthening Standard, New Investigator, Strengthening Conference, Seed, Equipment, and Sabbatical) Grants only b. See *Part II § C.2* for requirements specific to conference and FASE Grant applications.

Title	Description
Letter of Intent Deadline	a. Required only for **Conference Grant** applications. The LOI must be submitted a minimum of 195 days before the conference begins. b. LOIs must follow the instructions in Part IV, A and be emailed to the program contact(s) below
Application Deadline(s)	a. **2022:** Thursday, October 6, 2022 (5:00 p.m. Eastern Time) b. **Conference Grants:** submitted after LOI decision response and a minimum of 150 days before the conference begins
Grant Duration:	a. 36-60 months for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants** b. Up to 24 months for all **Seed Grants** c. Up to 12 months for **Sabbatical Grants** d. Up to 60 months for **Conference Grants**
Maximum Award Amount(s):	a. Including indirect costs: $650,000 for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants**; $800,000 with specific partnerships (see *Part II § E*) b. Including indirect costs: $300,000 for all **Seed Grants** c. $50,000 for **Conference and Equipment Grants**
Program Area Priority Contact(s):	Dr. Charlotte Tuttle, (612) 449-8966 or charlotte.tuttle@usda.gov

Program Area Priority:
This program area priority supports research on development of theories, methods and applications of agricultural economics. It encourages applications in the following broad areas: agricultural market structure and performance; competitiveness in international trade and domestic markets; agricultural production and resource use; consumer behavior; farm labor and immigration and policy; agricultural policy design and impacts; technology development and adoption; and science and innovation policy.

The program area priority scope includes, but is not limited to:

a. Examine the economics of agriculture and food policy, including changes in trade, immigration, crop insurance, price stabilization and income support.
b. Factors addressing farm labor shortages, contributing to development and adoption of labor saving or substituting technology; implications for farmer and farm labor economic welfare. Address the particular concerns regarding technology adoption and decision-making challenges for historically underserved farmers and ranchers.
c. Examine factors contributing to pest resistance in pesticide use (and other pest management approaches) and the adoption of pest resistance mitigation strategies.
d. Economic and behavioral aspects of consumption or savings behavior, consumer financial decision making; agricultural production and technology adoption, and the design and implementation of policy intended to affect those behaviors.
e. Examine the causes and consequences of food and nutritional insecurity.
f. Examine the economic implications of big data on agricultural markets, industry structure, and agricultural and food value chains, how big data informs decision making by agricultural producers, policy makers, and consumers and enhances market efficiency

and performance. Development of innovative empirical methods for addressing economic analysis using big data, machine learning, and natural language processing techniques.

g. Examine the economics of the bio-economy. Assess the economic and environmental impact of policies and regulations designed to advance the bio-economy. Address issues of acceptance and perception by consumers and producers. Examine the economics and performance of the supply chains that emerge to implement new technologies, how they are affected by various policies, and their competitiveness and trade implications.
h. Examine the impact of disasters on food supply chain resilience, agricultural production, and consumer behavior.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Projects with specific types of partnerships (small and mid-sized or minority-serving degree-granting institutions not on the list of most successful institutions; EPSCoR institutions; or international partners) have the opportunity to request up to an additional $150,000 as specified in the key information table. See *Part II § E* for detailed eligibility restrictions.
c. Projects addressing topics related to environmental and natural resource economics should be submitted to Environmental and Natural Resource Economics (A1651).

6c. Social Implications of Food and Agricultural Technologies

Table 30: Social Implications of Food and Agricultural Technologies Key Information

Title	Description
Program Code:	A1642
Program Code Name:	Social Implications of Food and Agricultural Technologies
CFDA Number	10.310
Project Type(s):	Research Projects or Integrated (research with education and /or extension) Projects only
Grant Type(s):	a. Standard, Conference, and FASE (Strengthening Standard, New Investigator, Strengthening Conference, Seed, Equipment, and Sabbatical) Grants only b. See *Part II § C.2* for requirements specific to conference and FASE Grant applications.
Letter of Intent Deadline	a. Required only for **Conference Grant** applications. The LOI must be submitted a minimum of 195 days before the conference begins. b. LOIs must follow the instructions in Part IV, A and be emailed to the program contact(s) below
Application Deadline(s)	a. **2022:** Thursday, November 3, 2022 (5:00 p.m. Eastern Time) b. **Conference Grants:** submitted after LOI decision response and a minimum of 150 days before the conference begins
Grant Duration:	a. 36-60 months for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants** b. Up to 24 months for all **Seed Grants** c. Up to 12 months for **Sabbatical Grants** d. Up to 60 months for **Conference Grants**
Maximum Award Amount(s):	a. Including indirect costs: $650,000 for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants** b. Including indirect costs: $300,000 for all **Seed Grants** c. $50,000 for **Conference and Equipment Grants**
Program Area Priority Contact(s):	a. Dr. Charlotte Tuttle, (612) 449-8966 or charlotte.tuttle@usda.gov b. Dr. Ganesh Bora, (816) 489-0944 or ganesh.bora@usda.gov c. Dr. David Songstad, (816) 412-7422 or david.songstad@usda.gov

Program Area Priority:

Examining the social implications of technology is a form of technology assessment that anticipates the unforeseen and unintended consequences of technological innovation, including cultural, health, welfare, equity, ethical, and environmental impacts. A critical lesson learned from past experiences with the application of scientific discoveries and technological innovations to agricultural production is that public trust in science begins with and requires ongoing transparency and open deliberation. Technologies such as gene drives and genome editing, big data, nanotechnology, autonomous technologies and novel foods have tremendous capability in shaping the future of agriculture, requiring the scientific community to develop effective means of communicating and engaging with the public. The National Academies of Sciences, Engineering, and Medicine recommended that for these innovations to become applicable to

agriculture, there should be a dialogue between scientists, legal scholars, bioethicists, social scientists, the public, and other stakeholders to assess the merits and risks of new technologies and scientific discoveries, and pursue open and participatory approaches to meaningfully engage with potentially impacted communities about these issues.

Research project applications must address the following:

a. Assess the social, ethical, cultural, legal, and other potential impacts that a broad range of emerging and disruptive technologies, including breakthrough scientific discoveries, may pose for society, agricultural markets, agricultural communities and rural prosperity, food manufacturing industry, consumer preferences, and other domains and consider models for ameliorating challenge to the technologies; and
b. Involve a range of individuals including scientists, legal scholars, bioethicists, social scientists, and researchers from the humanities, the public, and other stakeholders to assess the technology's merits and risks and/or examine issues and modes of communication that can result in open and participatory approaches to effectively involve the public and engage with communities potentially impacted by the technology in deliberations over these issues throughout the lifespan of the project.

Technologies and scientific advancements of interest include (order does not indicate importance):

a. Development and implementation of technologies with regard to climate-smart agriculture and forestry practices, as well as measurement, monitoring, and mitigation of agricultural greenhouse gas emissions;
b. Application of gene editing and gene drives in agricultural systems;
c. Application of nanotechnology in agriculture and food systems;
d. Analysis of big data, and tools and approaches for collecting big data from agricultural producers; privacy and security implications for the collection, storage, availability and sharing of Big Data on individuals, technologies, businesses, and/or communities;
e. Implications of artificial intelligence, machine learning and predictive decision making to society and agriculture and food systems; and
f. Implementation of autonomous technologies, the internet of things, artificial intelligence, and systems within the agricultural production, food manufacturing, and supply chains.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Conference applications are encouraged under this program area priority.
c. Projects must include trans/multi/interdisciplinary components and/or disciplinary specialists.
d. Projects are encouraged to develop new models of collaboration and idea generation to engage in active transdisciplinary exchange and efforts.
e. Applications on the <u>adoption and diffusion of agricultural technologies</u> should be submitted to the Economics, Markets and Trade (A1641), Engineering for Agricultural Production and Processing (A1521 in Agriculture Systems and Technology), Engineering for Precision Crop and Water Management (A1551 in Agriculture Systems and Technology), or the Critical Agricultural Research and Extension (CARE, A1701 in Crosscutting Programs) program area priorities.

6d. Rural Economic Development

Table 31: Environmental and Natural Resource Economics Key Information

Title	Description
Program Code:	A1661
Program Code Name:	Rural Economic Development
CFDA Number	10.310
Project Type(s):	Research Projects or Integrated (research with education and/or extension) Projects only
Grant Type(s):	a. Standard, Conference, and FASE (Strengthening Standard, New Investigator, Strengthening Conference, Seed, Equipment, and Sabbatical) Grants only b. See *Part II § C.2* for requirements specific to conference and FASE Grant applications.
Letter of Intent Deadline	a. Required only for **Conference Grant** applications. The LOI must be submitted a minimum of 195 days before the conference begins. b. LOIs must follow the instructions in Part IV, A and be emailed to the program contact(s) below
Application Deadline(s)	a. **2022:** Thursday, September 15, 2022 (5:00 p.m. Eastern Time) b. **Conference Grants:** submitted after LOI decision response and a minimum of 150 days before the conference begins
Grant Duration:	a. 36-60 months for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants** b. Up to 24 months for all **Seed Grants** c. Up to 12 months for **Sabbatical Grants** d. Up to 60 months for **Conference Grants**
Maximum Award Amount(s):	a. Including indirect costs: $650,000 for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants** b. Including indirect costs: $300,000 for all **Seed Grants** c. $50,000 for **Conference and Equipment Grants**
Program Area Priority Contact(s):	Dr. Keith Harris, (816) 916-0332 or keith.harris@usda.gov

Program Area Priority:

This program area priority supports rigorous theoretical and empirical efforts to create and examine innovative approaches for advancing economic opportunities for rural entrepreneurs and communities, with an aim to promote rural prosperity and well-being. The intent of the program area priority is to improve the understanding of the factors and conditions that enhance economic opportunities for food, agricultural and rural businesses through tools and methods from the various social sciences, (i.e., sociology, demography, economics, geography, etc.). Studies that focus on women, and ethnic and/or racial minority groups are of interest.

Projects can be either integrated (to include extension and/or education, along with research) or research only. Projects may evaluate the institutional, social, or economic factors affecting decision making and policy development to enhance the economic growth and well-being of rural communities.

This program area priority focuses mainly on entrepreneurs, small businesses, and other local-level employers and services who are important sources of employment, and/or on other issues "beyond the farm gate."

The emphases of this program area priority include, but are not limited to:

a. Examine the impacts of COVID-19 or other natural disasters on household and community food and nutrition security.
b. Explore place-making assets, including cultural amenities, performing arts and the aesthetic character of rural communities, and their importance and impacts on rural livability, new resident attraction and retention, and economic development and prosperity.
c. Identify strategies for economic growth in regions of persistent extreme poverty that can directly or indirectly impact public-health crises including COVID-19, opioid abuse and suicide.
d. Examine the private and public returns to expanding broadband infrastructure into rural areas, the barriers to broadband deployment and adoption and the mechanisms that might ameliorate those factors. Examine the potential relationship between access to broadband and health outcomes, educational attainment, entrepreneurship, and job growth. Examine how broadband availability can directly or indirectly impact public-health crises including COVID-19, opioid abuse and suicide.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Integrated project applications must include research and at least one other function (i.e., education, extension, or both)
c. For projects that focus mainly on farms, see the Small and Medium-Sized Farms program area priority (A1601)

6e. Environmental and Natural Resource Economics

Table 32: Environmental and Natural Resource Economics Key Information

Title	Description
Program Code:	A1651
Program Code Name:	Environmental and Natural Resource Economics
CFDA Number	10.310
Project Type(s):	Research Projects or Integrated Projects only
Grant Type(s):	a. Standard, Conference, and FASE (Strengthening Standard, New Investigator, Strengthening Conference, Seed, Equipment, and Sabbatical) Grants only b. See *Part II § C.2* for requirements specific to conference and FASE Grant applications.
Letter of Intent Deadline	a. Required only for **Conference Grant** applications. The LOI must be submitted a minimum of 195 days before the conference begins. b. LOIs must follow the instructions in Part IV, A and be emailed to the program contact(s) below

Title	Description
Application Deadline(s)	a. **2022:** Thursday, September 15, 2022 (5:00 p.m. Eastern Time) b. **Conference Grants:** submitted after LOI decision response and a minimum of 150 days before the conference begins
Grant Duration:	a. 36-60 months for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants** b. Up to 24 months for all **Seed Grants** c. Up to 12 months for **Sabbatical Grants** d. Up to 60 months for **Conference Grants**
Maximum Award Amount(s):	a. Including indirect costs: $650,000 for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants**; $800,000 with specific partnerships (see *Part II § E*) b. Including indirect costs: $300,000 for all **Seed Grants** c. $50,000 for **Conference and Equipment Grants**
Program Area Priority Contact(s):	Dr. Charlotte Tuttle, (612) 449-8966 or charlotte.tuttle@usda.gov

Program Area Priority:
This program area priority examines the interrelationship of natural resources and the environment with agriculture and rural communities. Research projects funded through this priority area will advance economic theories, methods, tools, analyses, and applications that contribute to understanding an ecological approach to agriculture (including forestry and aquaculture) to balance production and sustainable resource management simultaneously.

Research and integrated projects to advance efforts toward the development of standardized nonmarket benefit estimation and benefits transfer methods will be welcomed in this solicitation. Transferring benefits estimates from one site to another is fraught with problems; however, there is great need to enhance benefits transfer methods to better enable design and implementation of environmental and natural resource policy to address issues such as climate change, water quality, nutrient loss and other similar issues. The challenge has been to develop a standardized approach to nonmarket valuation and benefits transfer to make the process more operational and easier to use by policymakers and program managers. The benefits transfer issue is one that is fundamental to resource policy but after decades is yet to be resolved. This program area priority may be able to move the field closer to a solution or perhaps solve the problem.

Other research topics include, but are not limited to:

a. Examine the relationship between agriculture, natural resource conservation, and the environment. Examine the economics of conservation and environmental policies and their impact on agriculture and rural communities. Assess the impact of various policies on and the value of ecosystem services.
b. Examine the design of policies and incentive mechanisms to promote resource conservation and sustainability. Development of metrics to assess changes in the value of ecosystem services resulting from the adoption of conservation management practices at various scales. Develop decision support tools to be able to consider and coherently compare (in quantitative and economic terms) the various trade-offs of alternative options

at differing scales and to understand how these vary between locations and across time. Explore the economic efficiency impacts of alternative approaches for monitoring and enforcement of conservation compliance.

c. Examine the equity and efficiency impacts of carbon markets and climate smart agriculture and forestry (CSAF) practices, supply chains, and commodities. Assess approaches and trade-offs in promoting carbon sequestration and soil health in agricultural production. Assess the design, implementation, and economic impacts of carbon credit market policies to encourage carbon offsets and the relation between agricultural and nonagricultural carbon emissions and mitigation. Assess long term restrictions on land use that participation in carbon markets will entail. Assess how the structure of markets interact with adoption of CSAF practices and the demand for products or commodities that embody carbon reducing characteristics. Quantify and value the potential loss and risks to agricultural productivity and food security as a result of climate change.
d. Examine the economics of biosecurity and the interaction and transmission of zoonotic and other diseases between agriculture, the environment, wildlife, and humans.
e. Advance the integration of ecological/environmental sciences with economics and other social sciences both in research processes and methods and effective communication of scientific results and knowledge to a broad array of audiences.
f. Develop and implement a standardized protocol for developing nonmarket benefit estimates and applying benefit transfer (BT) to inform benefit-cost calculations for conservation and natural resource policy design and implementation. Develop a standardized and operational approach for applying BT from initial study site (or collection of study sites) to policy site (i.e., a site with no previously estimated nonmarket benefits for which estimates are needed for a policy induced benefit-cost calculation). Key features of a standardized BT approach might include robustness and replicability; involve valuation studies that are conducted and documented in a manner that supports BT; use of welfare-theoretic foundations; involve a comprehensive and systematic search for supporting transfer information; a robustness analyses to explore the sensitivity of estimates to key decision factors; and controlling for the diffuse impacts of agricultural conservation policies and the degree of substitutability between many policy sites. A standardized BT project may involve utilizing existing valuation studies sites to develop a standardized protocol with an application to "policy sites" with a test for robustness. Alternatively, original valuation studies may be pursued utilizing a standardized protocol -- with the benefit estimates applied to another site to serve as a proof of concept for the standardization protocol.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Projects that expand access of crop and animal production systems with an emphasis on historically underserved farmers and ranchers, where applicable, are encouraged.
c. Projects with specific types of partnerships (small and mid-sized or minority-serving degree-granting institutions not on the list of most successful institutions; EPSCoR institutions; or international partners) have the opportunity to request up to an additional $150,000 as specified in the key information table. See *Part II § E* for detailed eligibility

restrictions.

7. Crosscutting Programs

Background

Crosscutting programs address two or more of the following six priority areas:

a. Plant health and production and plant products;
b. Animal health and production and animal products;
c. Food safety, nutrition, and health;
d. Bioenergy, natural resources, and environment;
e. Agriculture systems and technology; and
f. Agriculture economics and rural communities.

Total program funds – Approximately **$42** million for each review cycle

Program Area Key Information:

a. For program area priorities soliciting Conference Grant applications (i.e., A1181, A1402, and A1541 only), Conference Grant applications may be submitted any time throughout the year. A Letter of Intent is required for a Conference Grant application, and it must be submitted a minimum of 195 days before conference begins. The full Conference Grant application must be submitted a minimum of 150 days before the conference begins.

Program Area Priorities – Each application must address at least one of the six program area priorities listed below. Details about each of the Crosscutting program area priorities are provided later in this section.

7a. Agricultural Microbiomes in Plant Systems and Natural Resources
7b. Critical Agricultural Research and Extension (CARE)
7c. Data Science for Food and Agriculture Systems (DSFAS)
7d. Inter-Disciplinary Engagement in Animal Systems (IDEAS)
7e. Agricultural Biosecurity
7f. Extension, Education & USDA Climate Hubs Partnership
7g. AFRI Commodity Board Co-funding Topics
7h. Rapid Response to Extreme Weather Events Across Food and Agricultural Systems
7i. Regional Innovation and Demonstration of Climate-smart Agriculture for Future Farms (CAFF)
7j. Center of Excellence for Meat and Poultry Processing and Food Safety Research and Innovation (MPPFSRI)

7a. Agricultural Microbiomes in Plant Systems and Natural Resources

Table 33: Agricultural Microbiomes in Plant Systems and Natural Resources Key Information

Title	Description
Program Code:	A1402
Program Code Name:	Agricultural Microbiomes in Plant Systems and Natural Resources
CFDA Number	10.310
Project Type(s):	Research Projects only

Title	Description
Grant Type(s):	a. Standard, Conference, and FASE (Strengthening Standard, New Investigator, Strengthening Conference, Seed, Equipment, and Sabbatical) Grants only b. See *Part II § C.2* for requirements specific to conference and FASE Grant applications.
Letter of Intent Deadline	a. Required only for **Conference Grant** applications. The LOI must be submitted a minimum of 195 days before the conference begins. b. LOIs must follow the instructions in Part IV, A and be emailed to the program contact(s) below
Application Deadline(s)	a. **2022:** Thursday, October 6, 2022 (5:00 p.m. Eastern Time) b. **Conference Grants:** submitted after LOI decision response and a minimum of 150 days before the conference begins
Grant Duration:	a. Up to 60 months for **Standard Grants, Strengthening Standard Grants, and New Investigator Standard Grants** b. Up to 24 months for all **Seed Grants** c. Up to 12 months for **Sabbatical Grants** d. Up to 60 months for **Conference Grants**
Maximum Award Amount(s):	a. Including indirect costs: $850,000 for **Standard Grants, Strengthening Standard Grants, and New Investigator Standard Grants** b. Including indirect costs: $300,000 for all **Seed Grants** c. $50,000 for **Conference and Equipment Grants**
Program Area Priority Contact(s):	a. Dr. Rubella Goswami, (202) 306-0954 or rubella.goswami@usda.gov b. Dr. Amy Ganguli, (816) 642-0813 or amy.ganguli@usda.gov c. Dr. Sandeep Kumar, (816) 832-7235 or sandeep.kumar@usda.gov

Program Area Priority:
Microbiomes have profound impacts on agricultural production systems as well as human, animal, plant, and environmental health. Microbiome research is critical for improving agricultural productivity, sustainability of agricultural ecosystems, safety of the food supply, carbon sequestration in agricultural systems, and meeting the challenge of feeding a rapidly growing world population. Better understanding of microbiomes will help reduce use of chemicals (pesticides, antibiotics, and biocides) in food production, lead to the development of safer alternatives for the management of agriculturally-important pests and diseases, optimize nutrient utilization efficiency, and reduce environmental footprints of agriculture and food systems. Understanding the multipartite interactions among the host, environment, and the microbiome is critical for improving and sustaining agricultural productivity and quality in plant systems, associated natural resources, human nutrition and health. Plant productivity includes biotic factors affecting plant health such as either pests, diseases or vectors as well as abiotic factors (water, soil health). Research supported by this program area priority will help fill major knowledge gaps in characterizing agricultural microbiomes and microbiome functions across agricultural production systems, and natural resources through crosscutting projects. Projects focusing on microbiomes associated with livestock, aquacultured animal species, or any animals other than vectors (e.g., insect or nematode) of plant-associated microbes are beyond the scope

of this program area priority. Also, beyond the scope of this program are studies that do not have a strong focus on the **community of microorganisms** associated with the plant, such as studies of interactions between a single microbial species and its plant host. This research will capitalize on the convergence of low-cost sequencing and "omics" technologies, manipulation of microbiome composition and of phage and microbial genes (transposons, integrons), genome editing tools, and other novel tools for studying microbiota's structure and function. Development of tools to expand the use of gene editing in agriculturally relevant microbes is encouraged.

Applications must address one of the following:

a. Characterize molecular mechanisms and signal exchange involved in microbiome assembly and interactions in various environments or physiological states such as stress, diseases, or growth stages.
b. Functionally characterize microbiomes and microbiome metabolites in conferring specific host phenotypes (such as disease resistance or drought tolerance), optimization of environmental processes (such as water uptake, nutrient cycling, or carbon sequestration), and/or host-microbiome interactions (such as host influences on microbiome composition).
c. Define genomic elements that shape functional diversity, virulence, and resistance to sanitation and/or antimicrobial treatment of foodborne pathogens associated with plant foods.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Projects focusing on microbiomes associated with livestock or aquacultured food-fish should be submitted to the most relevant program area priority within the Animal Health and Production and Animal Products program area in this RFA.
c. NIFA is partnering with Ireland and Northern Ireland under the U.S.-Ireland Research and Development Partnership to solicit collaborative research applications in the Agricultural Microbiomes in Plant Systems and Natural Resources program area priority. For more information including FAQs about this program, visit the NIFA, Ireland, and Northern Ireland partnership page. Applicants submitting to this partnership must select Collaborative as the grant type and their application title should begin as "TRIPARTITE: [full title]".

7b. Critical Agricultural Research and Extension (CARE)

Table 34: Critical Agricultural Research and Extension (CARE) Key Information

Title	Description
Program Code:	A1701
Program Code Name:	Critical Agricultural Research and Extension (CARE)
CFDA Number	10.310
Project Type(s):	Integrated (research and extension) Projects only

Title	Description
Grant Type(s):	a. Standard and FASE (Strengthening Standard and New Investigator) Grants only b. See *Part II § C.2* for requirements specific to FASE Grant applications.
Letter of Intent Deadline	Not applicable
Application Deadline(s)	**2022:** Thursday, September 15, 2022 (5:00 p.m. Eastern Time)
Grant Duration:	12-36 months
Maximum Award Amount(s):	Including indirect costs: $300,000
Program Area Priority Contact(s):	a. Dr. Vijay Nandula (816) 894-7229, or vijay.nandula@usda.gov b. Dr. Andres Cibils, (816) 745-0369 or andres.cibils@usda.gov c. Dr. James Dobrowolski, (202) 420-8918 or james.dobrowolski@usda.gov

Program Area Priority:
This program area addresses critical challenges and opportunities that research and extension, together, can address to improve our nation's agricultural and food systems. Despite prior investments in basic and applied research, critical problems continue to impede the efficient production of agriculturally-important plants and animals, for producing safe and nutritious foods, and to meet environmental challenges for agriculture, including climate change. These problems may be local, regional, or national, and may call for work focused on one or more scientific disciplines. However, all need immediate attention to meet producer and consumer needs. Finding and implementing solutions to these critical problems require partnership and close coordination among researchers, extension experts, and practitioners in food and agricultural enterprises. Funded projects are expected to produce results that lead to practices, tools, and technologies (e.g., climate-smart agriculture and forestry) that are rapidly adopted by end-users. Projects based on indigenous traditional ecological knowledge are appropriate for this program area priority.

This program area priority is designed to support integrated activities based on rigorous research combined with effective extension and involvement of stakeholders to develop and rapidly apply new knowledge or practices resulting in improved well-being of the people, communities, plants, and animals involved in, and affected by, agriculture and food-production systems.

The program area priority seeks applications that:

a. Focus on a clear, time-sensitive, stakeholder-identified need or problem for agriculture;
b. Explain the magnitude (e.g., unexpected losses of income or employment, acres affected, estimated or actual economic costs to specified agricultural or food system, private industry, landowners, rural communities, adverse effects on the environment, risk of disease or illnesses) of the problem and the rationale for targeting it;
c. Describe a meaningful approach for blending research and extension expertise and other outreach and implementation approaches throughout the project to address principal objectives;

d. Provide evidence that the project is aligned to priorities listed above;
e. State expected solutions or improvements and how these will be assessed and measured;
f. Address the potential cost of a proposed solution and describe how it can be scaled to be sustainable in the short term and long term; and
g. Explain how the project will strengthen agricultural and food-production systems and how results will be adopted or applied at a local, regional, or national level.

Each application must address one or more of the six priorities for AFRI**:**

A. Plant health and Production and Plant Products;
B. Animal Health and Production and Animal Products;
C. Food Safety, Nutrition, and Health;
D. Bioenergy, Natural Resources, and Environment;
E. Agriculture Systems and Technology; and
F. Agriculture Economics and Rural Communities.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Projects focusing on species and commodities that are important to underserved farmers and ranchers or small- or medium-sized farms or ranches are encouraged.
c. All applications must adhere to the requirements in *Part IV*. If submitting an integrated Research and Extension application, please refer to specific content requirements for integrated applications. Applications that do not adhere to these requirements will not be reviewed.
d. A justification of how the project addresses a critical stakeholder need must be included in the Project Narrative of the full application.
e. Strict focus on short- to medium-term application of results is a requirement of this program area priority.
f. Applications must demonstrate that outcomes of the project period can be implemented within 2 years after the grant ends.
g. Applications from and collaborations with minority serving institutions, small to mid-sized institutions, and/or institutions within the EPSCoR states are welcome in this program area priority.
h. Applications that include collaborations with international partners may also be submitted. The AFRI International Partnerships webpage contains additional information on international partnerships.
i. In the full application, a letter of support must be included from the stakeholder(s) which details their role and their degree of interest in implementing projected outcomes.

7c. Data Science for Food and Agricultural Systems (DSFAS)

Table 35: Data Science for Food and Agricultural Systems (DSFAS) Key Information

Title	Description
Program Code:	A1541
Program Code Name:	Data Science for Food and Agricultural Systems (DSFAS)
CFDA Number	10.310
Project Type(s):	Research Projects or Integrated (research, education and /or extension) Projects only

Title	Description
Grant Type(s):	a. Standard, Conference, and FASE (Strengthening Standard, New Investigator, Strengthening Conference, Seed, Equipment, and Sabbatical) Grants only for **regular DSFAS Projects** b. Standard and FASE (Strengthening Standard) Grants only for **all Coordinated Innovation Networks Projects** c. See *Part II § C.2* for requirements specific to conference and FASE Grant applications.
Letter of Intent Deadline	a. Required only for **Conference Grant** applications. The LOI must be submitted a minimum of 195 days before the conference begins. b. LOIs must follow the instructions in Part IV, A and be emailed to the program contact(s) below
Application Deadline(s)	a. **2022:** Thursday, November 17, 2022 (5:00 p.m. Eastern Time) b. **Conference Grants:** submitted after LOI decision response and a minimum of 150 days before the conference begins
Grant Duration:	a. 36-60 months for **Standard Grants, Strengthening Standard Grants, and New Investigator Standard Grants** b. Up to 24 months for all **Seed Grants** c. Up to 12 months for **Sabbatical Grants** d. Up to 60 months for **Conference Grants**
Maximum Award Amount(s):	a. Including indirect costs: $650,000 for **regular DSFAS Projects**; $800,000 with specific partnerships (see *Part II § E*) b. Including indirect costs: $1,000,000 for **Coordinated Innovation Networks Projects**; $1,150,000 with specific partnerships (see *Part II § E*) c. Including indirect costs: $3,000,000 for **Coordinated Innovation Networks Climate/Food Supply Modeling Projects**; $3,150,000 with specific partnerships (see *Part II § E*) d. Including indirect costs: $300,000 for all **Seed Grants** e. $50,000 for **Conference and Equipment Grants**
Program Area Priority Contact(s):	a. Dr. Ann Stapleton, (816) 274-1942 or NIFA-DSFAS@usda.gov b. Dr. Ganesh Bora, (816) 489-0944 c. Dr. Hongda Chen, (202) 445-5582 d. Dr. Steven Thomson, (202) 603-1053

Program Area Priority:
This program area priority focuses on intersections between data science/artificial intelligence (AI) and agricultural areas in order to enable systems and communities to effectively utilize data, improve resource management, and integrate new technologies and approaches to further U.S. food and agriculture enterprises. The program encourages university-based research as well as public and private partnerships.

Applications for research and integrated research projects must address one of the six AFRI priority areas. We especially encourage proposals in the areas of climate-smart agriculture and forestry, nutrition security, economic revitalization, and justice; projects that focus on intersections between one or more of these areas are also strongly encouraged. The data

science/AI aspects of proposals should clearly relate to advancements in the U.S. AI priorities and strategic pillars. The most competitive proposals will be equally well grounded in agricultural sciences and in data science/AI; in addition, competitive proposals will clearly communicate the relevance and novelty of the proposed research in both areas.

Within the project description, all applications must include a sustainability plan explaining how project products and services will be accessible during and after the funding period. Projects that include development of tools and platforms are strongly encouraged to build upon existing tools and platforms such as R/Python and the national cyberinfrastructure (e.g., XSEDE, Science Gateways). Proposals that include development of tools and platforms should include details of software development practices such as testing and validation plans, and plans for governance, development and support of user and developer communities. Innovative and effective methods for participation of stakeholders in tools and platform development priority-setting and testing are strongly encouraged. Any development of data resources must use FAIR standards; long-term access and curation must be described in the sustainability plan. We also encourage use of the CARE data standards.

Data Science for Food and Agriculture applications must fall under one of the following types:

a. Regular **DSFAS** applications with proposed budget requests not exceeding **$650,000** total per project (including indirect costs) for project periods of three to five years.
    1) The title of the **DSFAS** project applications must begin with "**DSFAS:** [full title…]".
    2) DSFAS projects with specific types of partnerships (small and mid-sized or minority-serving degree-granting institutions not on the list of most successful institutions; EPSCoR institutions; or international partners) have the opportunity to request up to an additional $150,000 for a total of $800,000. See *Part II § E* for detailed eligibility restrictions.

b. **DSFAS Coordinated Innovation Networks** (CIN) research or integrated applications for project periods of three to five years.
    1) All CIN projects must address the following:
        a) Synergy: There should be a demonstrable benefit to the existence of a multidisciplinary, multi-sector, or multifunctional CIN that would not otherwise be possible by the participating entities and individuals operating independently.
        b) Contribution: Each participating individual or entity should have a unique, meaningful, and active contribution to the network that is critical to the network's functioning, performance, and success in addressing bottlenecks in critical areas.
        c) Continuity: There should be a sustainability plan for network persistence beyond the duration of initial grant support (e.g., identification of additional funding sources and/or more formal organizational arrangements).
        d) Management: There should be a plan for coordination and oversight including, but not limited to, communication, leadership, advisory boards, milestones, and evolution over time (e.g., new objectives or new participants).

    2) **DSFAS Coordinated Innovation Networks** (CIN) applications with proposed budget requests not exceeding **$1,000,000** total per project (including indirect costs). These proposals must meet the criteria in the DSFAS research priorities

section and the additional CIN criteria above. Applications should start their titles as "**DSFAS-CIN**: [full title…]".

3) **DSFAS-CIN** projects with specific types of partnerships (small and mid-sized or minority-serving degree-granting institutions not on the list of most successful institutions; EPSCoR institutions; or international partners) have the opportunity to request up to an additional $150,000 for a total of $1,150,000. See *Part II § E* for detailed eligibility restrictions.

4) **DSFAS Coordinated Innovation Networks Climate/Food Supply Modeling** (CIN-CM/FM) applications in the special focus area of climate or food supply chain modeling with proposed budget requests not exceeding **$3,000,000** total per project (including indirect costs).
    a) Applications for DSFAS-CIN Climate Modeling should start their titles as "**DSFAS-CIN-CM**: [full title]". Creative, novel projects that meet the overall goals of advancing both climate modeling and data science/AI areas are encouraged. Examples in the list below are meant to inspire thought and are not prescriptive:
        i. Develop new AI/analytics to address current needs in climate change modeling, especially to support carbon markets, in the presence of measurement uncertainty and mixtures of private and public data. This could, in turn, lead to new approaches to multi-scale, multi-timeframe optimization under uncertainty.
        ii. Develop, implement, or further evaluate novel AI approaches that leverage equifinality and data to improve climate modeling for food and agricultural systems. Work may include use of social, economic, biological, or physical parameters in optimization and prediction of intervention effects and would build capacity for future research in model parameterization and scaling.
    b) Applications for the DSFAS-CIN Food Supply Modeling priority should start their titles as "**DSFAS-CIN-FM**: [full title]". This priority solicits proposals to advance food systems simulation modeling, especially examining transitions to robust, resilient, and cooperative food supply networks, and with a focus on underserved communities. Creative, novel projects that advance both food supply modeling and data science/AI are encouraged. It is anticipated that a broad range of institutions will be involved in the network. Examples in the list below are meant as inspiration and are not prescriptive:
        i. Enhance food supply models with new methods for modeling trust relationships, cooperative market opportunities, and rapid shifts in response to future shocks while optimizing nutritional security, leading to advances in network modeling methodology.
        ii. Incorporate simulations and optimizations that include novel technologies, business types, and analysis of leverage points to support resilient, climate-safe, profitable food system components and actors relevant to new entrants to agriculture and underserved communities while advancing modeling of complex qualitative -

quantitative systems.

iii. The priority seeks computable general or partial equilibrium models, whether static or dynamic, that are designed to capture the trade-offs and market dynamics of a transition to a more resilient, equitable and sustainable food system. Model the relationship between economic efficiency, market dynamics, and resiliency. Examine equity and efficiency trade-offs in food systems and dynamic interventions to reduce tradeoff impact. This would increase capacity for future equilibrium modeling.

5) **DSFAS-CIN-CM/FM** projects with specific types of partnerships (small and mid-sized or minority-serving degree-granting institutions not on the list of most successful institutions; EPSCoR institutions; or international partners) have the opportunity to request up to an additional $150,000 for a total of $3,150,000. See *Part II § E* for detailed eligibility restrictions.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. For additional resources on DSFAS including frequently asked questions, see the DSFAS webpage.
c. NIFA is partnering with Ireland and Northern Ireland under the U.S.-Ireland Research and Development Partnership to solicit collaborative research applications in the Data Science for Food and Agricultural Systems (DSFAS) program area priority for regular projects. For more information including FAQs about this program, visit the NIFA, Ireland, and Northern Ireland partnership page. Applicants submitting to this partnership must select Collaborative as the grant type and their application title should begin as "TRIPARTITE: [full title]". **Note: Regular DSFAS applications submitted for U.S.-Ireland Tripartite Collaborative grants are ineligible for U.S. funding above the research program maximum of $650,000; DSFAS-CIN and DSFAS-CIN-CM/FM projects are not eligible to apply under the tripartite.**

7d. Inter-Disciplinary Engagement in Animal Systems (IDEAS)

Table 36: Inter-Disciplinary Engagement in Animal Systems (IDEAS) Key Information

Title	Description
Program Code:	A1261
Program Code Name:	Inter-Disciplinary Engagement in Animal Systems (IDEAS)
CFDA Number	10.310
Project Type(s):	Integrated Projects (Research and Extension or Education) only
Grant Type(s):	a. Standard, Conference, and FASE (Strengthening Standard, New Investigator, Strengthening Conference, Seed, Equipment, and Sabbatical) Grants only b. See *Part II § C.2* for requirements specific to conference and FASE Grant applications.

Title	Description
Letter of Intent Deadline	a. Required only for **Conference Grant** applications. The LOI must be submitted a minimum of 195 days before the conference begins. b. LOIs must follow the instructions in Part IV, A and be emailed to the program contact(s) below
Application Deadline(s)	a. **2022:** Thursday, October 6, 2022 (5:00 p.m. Eastern Time) b. **Conference Grants:** submitted after LOI decision response and a minimum of 150 days before the conference begins
Grant Duration:	a. Up to 60 months for **Standard Grants, Strengthening Standard Grants, and New Investigator Grants** a. Up to 24 months for all **Seed Grants** b. Up to 12 months for **Sabbatical Grants** c. Up to 60 months for **Conference Grants**
Maximum Award Amount(s):	b. Including indirect costs: $1,000,000 for **Standard Grants, Strengthening Standard Grants, and New Investigator Standard Grants** c. Including indirect costs: $300,000 for all **Seed Grants** d. $50,000 for **Conference and Equipment Grants**
Program Area Priority Contact(s):	a. Dr. Angelica Van Goor, (816) 584-5304 or angelica.van.goor@usda.gov b. Dr. Ganesh Bora, (816) 489-0944 or ganesh.bora@usda.gov c. Dr. Andres Cibils, (816) 745-0369 or andres.cibils@usda.gov

Program Area Priority:
This program priority area seeks to bridge traditional disciplinary divides and address complex issues in animal agriculture (including aquaculture). This will require new interdisciplinary work anchored in animal and veterinary medical sciences to support food and agriculture production. Interdisciplinary is defined as integrating knowledge and methods, using a real synthesis of approaches that bring together diverse backgrounds and disciplines as well as diverse sources of data (information) in novel, integrative ways to solve pressing issues. Given the complexity of social, cultural, environmental, economic, and technologic challenges facing the food and agriculture system in the United States today, broader views at the intersection among multiple disciplines are essential to spur creativity, inspire innovation, and develop solutions.

This program area priority encourages university-based research as well as public and private partnerships. With animal and veterinary medical science at the core, some broad emphasis areas to be supported by this program area priority include, but are not limited to:

a. Precision animal management
    1) Developing climate-smart methods and technologies to enhance animal production and increase productivity: use of spatial and temporal resources; resource-smart feeding and monitoring, breeding, and management; and animal health and animal products to ensure and enhance economic viability.
    2) Optimizing animal management for improved product quality, animal health and human health, including challenges that are exacerbated by and/or contribute to climate change.
b. Environmental synergies of animal production

1) Managing emissions to the atmosphere (greenhouse gases) and hydrosphere in various production systems to achieve synergy between animal production and environmental quality.
2) Recycling, reusing co-products of animal agriculture or aquaculture (e.g., manure management for efficient nutrient use).
3) Optimizing animal management for environmental health.

c. Societal aspects of animal welfare
   1) Identifying and resolving factors that influence building trust around animal agriculture or aquaculture across a diversity of communities such as consumers and producers to improve animal welfare.
   2) Examining consumer life experiences and other factors (e.g., profession, culture, and environment) that influence perceptions of agricultural animal welfare and preferences for how production systems should respond.
   3) Exploring opportunities for greater and meaningful public engagement in the policy and practices of animal agriculture or aquaculture for improved animal welfare.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Projects focusing on species and commodities that are important to underserved farmers and ranchers or small- or medium-sized farms or ranches are encouraged.
c. NIFA is partnering with Ireland and Northern Ireland under the U.S.-Ireland Research and Development Partnership to solicit collaborative research applications in the Inter-Disciplinary Engagement in Animal Systems (IDEAS) program area priority. For more information including FAQs about this program, visit the NIFA, Ireland, and Northern Ireland partnership page. Applicants submitting to this partnership must select Collaborative as the grant type and their application title should begin as "TRIPARTITE: [full title]".

7e. Agricultural Biosecurity

Table 37: Agricultural Biosecurity Key Information

Title	Description
Program Code:	A1181
Program Code Name:	Agricultural Biosecurity
CFDA Number	10.310
Project Type(s):	Research, Extension, and Integrated Projects only
Grant Type(s):	a. Standard, Conference, and FASE (Strengthening Standard, New Investigator, Strengthening Conference, Seed, Equipment, and Sabbatical) Grants only b. See *Part II § C.2* for requirements specific to conference and FASE Grant applications.
Letter of Intent Deadline	a. Required only for **Conference Grant** applications. The LOI must be submitted a minimum of 195 days before the conference begins. b. LOIs must follow the instructions in Part IV, A and be emailed to the program contact(s) below

Title	Description
Application Deadline(s)	a. **2022:** Thursday, October 20, 2022 (5:00 p.m. Eastern Time) b. **Conference Grants:** submitted after LOI decision response and a minimum of 150 days before the conference begins
Grant Duration:	a. 36-60 months for **Standard Grants, Strengthening Standard Grants, and New Investigator Standard Grants** b. Up to 24 months for all **Seed Grants** c. Up to 12 months for **Sabbatical Grants** d. Up to 60 months for **Conference Grants**
Maximum Award Amount(s):	a. Including indirect costs: $650,000 for **single-function projects**; $800,000 with specific partnerships (see *Part II § E*) b. Including indirect costs: $1,000,000 for **integrated projects** c. Including indirect costs: $300,000 for all **Seed Grants** d. $50,000 for **Conference and Equipment Grants**
Program Area Priority Contact(s):	a. Dr. Amer Fayad, (816) 894-7228 or amer.fayad@usda.gov b. Dr. Tim Sullivan, (816) 527-5434 or timothy.sullivan@usda.gov c. Dr. Michelle Colby, (202) 557-8815 or michelle.colby@usda.gov

Program Area Priority:
This program area priority focuses on increasing our national capacity to prevent, rapidly detect, and respond to biological threats to the U.S. agriculture and food supply. Supported activities will be aimed at increasing agricultural biosecurity at the regional and national levels, and across the public and private sectors. Addressing the vulnerabilities of our nation's food and agricultural system requires a concerted effort, sustained investment, and a coordinated strategy that protects the U.S. food and agriculture system against threats from pests, diseases, contaminants, and disasters.

Applications must address one or more of the following (order does not indicate importance):

a. Detection and diagnostics of transboundary, emerging, or re-emerging pests and diseases associated with animal production systems and/or transboundary, emerging, re-emerging, or invasive diseases, insects and weeds associated with plant production systems. Non-traditional detection methodologies such as syndromic surveillance, predictive analysis of satellite imagery, etc. will also be considered; or
b. Rapid response to, and recovery from, pests and diseases that pose large-scale biosecurity threats to plant and animal production, including existing and imminent threats to U.S. agricultural production and food supply systems.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Projects focusing on specific pests and/or diseases will be restricted to transboundary, emerging, or re-emerging pests and diseases associated with animal production systems and/or transboundary, emerging, re-emerging, or invasive diseases, insects and weeds associated with plant production systems.
c. Developing early-stage research technologies, practices, or strategies to reduce the impact of pests and diseases that pose a biosecurity concern is encouraged. Activities associated

with the commercialization of patented research are not suitable for this program. Consider applying to the Small Business Innovation Research (SBIR) program if your project is focused on development or commercialization of instrumentation.

d. Proposals must include metrics to justify the project's importance to agricultural biosecurity and identify at least one significant impact that could result from the work being proposed.
e. Collaboration with existing national biosecurity framework components including diagnostic and biological containment laboratories such as the National Plant Diagnostic Network (NPDN) and the National Animal Health Laboratory Network (NAHLN), regional IPM centers, IR-4 laboratories, regulatory agencies, and industry (livestock (including aquaculture species), biopharmaceuticals, and crop protection) is highly encouraged.
f. Proposals that address common threats to agricultural biosecurity in both animal and plant systems are encouraged.
g. Proposals that address specific threats to agricultural biosecurity which may be exacerbated by climate change as well as proposals that increase resiliency of biosecurity systems in the face of climate change are encouraged.
h. International collaborations that enhance our ability to manage threats and reduce losses to U.S. agriculture are encouraged.
i. Inclusion of experiential learning opportunities for students on applied aspects of agricultural biosecurity as part of the proposed extension or research activities is encouraged.
j. For Integrated Projects including education, the educational component should not constitute more than one-third of the project budget.
k. Applications for projects on foodborne pathogen/contaminant detection should be submitted to the Food Safety and Defense program area priority (A1332).
l. Projects with specific types of partnerships (small and mid-sized or minority-serving degree-granting institutions not on the list of most successful institutions; EPSCoR institutions; or international partners) have the opportunity to request up to an additional $150,000 as specified in the key information table. See *Part II § E* for detailed eligibility restrictions.

7f. Extension, Education & USDA Climate Hubs Partnership

Table 38: Extension, Education & USDA Climate Hubs Partnership Key Information

Title	Description
Program Code:	A1721
Program Code Name:	Extension, Education & USDA Climate Hubs Partnership
CFDA Number	10.310
Project Type(s):	a. Extension Projects or Integrated (extension and education) Projects only for **Standard, Strengthening Standard, and New Investigator Standard Grants** b. Extension Projects only for **Coordinated Agricultural Project Grants**

Title	Description
Grant Type(s):	c. Standard, FASE (Strengthening Standard, New Investigator, and Strengthening CAP), and Coordinated Agricultural Project Grants only d. See *Part II § C.2* for requirements specific to FASE Grant applications.
Letter of Intent Deadline:	a. **2022:** Thursday, June 2, 2022 (5:00 p.m. Eastern Time) b. Required only for **Standard Grants, Strengthening Standard Grants and New Investigator Standard Grants**; LOI is not required for CAP grants c. LOIs must follow the instructions in Part IV, A and be emailed to ClimatePartnerships@usda.gov
Application Deadline(s):	**2022:** Thursday, October 6, 2022 (5:00 p.m. Eastern Time) for all applications
Grant Duration:	a. 36-60 months for **Standard Grants and Strengthening Standard Grants** b. 36-60 months for **Coordinated Agricultural Project Grants**
Maximum Award Amount(s):	a. Including indirect costs: $1,500,000 for **Standard Grants and Strengthening Standard Grants and New Investigator Standard Grants** b. Including indirect costs: $10,000,000 for a **Coordinated Agricultural Project Grant**; this program area priority anticipates making up to one CAP award for FY 2022
Program Area Priority Contact(s):	a. For **Standard, Strengthening Standard, and New Investigator Standard Grants:** a. Dr. Amy Ganguli, (816) 642-0813 or ClimatePartnerships@usda.gov b. Dr. Adam Wilke, (816) 398-5277 c. Dr. Andres Cibils, (816) 745-0369 d. Dr. Lydia Kaume, (816) 642-4607 e. Dr. Erica Kistner-Thomas, (816) 894-9283 f. Dr. Maurice Smith, (816) 518-1754 g. Dr. Steven Thomson, (202) 603-1053 h. Dr. Charlotte Tuttle, (612) 449-8966 b. For **Coordinated Agricultural Project Grants:** Dr. Amy Ganguli, (816) 642-0813 or ClimatePartnerships@usda.gov

Program Area Priority:
This program area priority will support projects that provide effective, translatable, and scalable approaches to address climate change through regional partnerships including the USDA Climate Hubs and extension (e.g., the Cooperative Extension Service). The USDA Climate Hubs develop and deliver science-based, region-specific information and technologies, with USDA agencies and partners, to agricultural and natural resource managers that enable climate-informed decision-making and provide access to assistance to implement those decisions.

The regional partnerships should work towards one or more of the following long-term socio-economic impacts (order does not indicate priority ranking):

a. measurement, monitoring, and mitigation of agricultural greenhouse gases ;
b. Climate-Smart Agriculture and Forestry (CSAF);
c. a diverse workforce that can effectively communicate about climate change with a variety of stakeholders and can incorporate climate considerations into managing working lands; and
d. environmental justice including equity in opportunities and burden-sharing.

Projects must meet the needs of one or more USDA Climate Hub regions, and applicants must identify within their letter of intent with which Climate Hub(s) they intend to collaborate. Regional balance among projects in this program area priority will be one of the factors considered in review and funding of the grants. Some broad emphasis areas to be supported by this program area priority include, but are not limited to:

a. innovative methods of collecting input from stakeholders on their needs, priorities, preferred methods of learning, and avenues for effective messaging;
b. human-centered, participatory program design;
c. formal education courses at the associate, undergraduate and/or graduate levels with extension service-learning fieldwork components;
d. fellowships to work at USDA Climate Hubs;
e. expanding USDA Climate Hub capacity to serve as a "climate clearinghouse" of tools and technologies for region-specific stakeholder needs;
f. K-12 teacher-training for hands-on learning and enhanced literacy about climate science and CSAF;
g. training for extension educators in climate science and CSAF;
h. training for public and private-sector technical service providers in CASF practices;
i. training on Climate-Smart Commodities and related food systems, including effects of climate on nutrition security and components of nutrient density, food safety, and food waste;
j. targeted programming for historically underserved groups that considers diverse literacy levels, language skills, and appropriate technologies;
k. initiatives to support the Civilian Climate Corps.

Applicants are encouraged to explore partnerships with other relevant entities such as NOAA Regional Integrated Sciences and Assessments (RISA) teams, USGS National and Regional Climate Adaptation Science Centers (CASCs), the Joint Fire Science Program and Fire Science Exchange Network, and other private, public, and non-profit organizations, as appropriate.

In addition to the priority above, this program area priority is soliciting applications to fund a single, national scale **Coordinated Agricultural Project (CAP) Grant for Climate Smart Extension**

a. Increased support for CSAF systems innovation is needed to position agriculture to combat the climate crisis and enhance ecological, social, and economic resilience. Achieving this requires national coordination and inclusive approaches that draw on diverse knowledge, experiences, and cultures. The Cooperative Extension System is uniquely positioned to facilitate the translation of climate science into actionable climate

information and knowledge through community engagement, participatory decision-making, and public-private partnerships to continue to lower barriers and increase the rate of adoption of CSAF practices and to increase climate literacy.

This CAP priority aims to build and enhance existing climate Extension networks, while identifying synergies among existing programs, and catalyzing new resources and tools that provide accessible, usable, and actionable science, for example building on the impacts from NIFA programs such as AFRI Sustainable Agricultural Systems and Foundational and Applied Science, to increase adoption of CSAF practices. This will support farmers, ranchers, and foresters in implementing climate smart and nature-based solutions, and will grow the cycle of learning, enhance resilience, and improve productivity.

b. NIFA anticipates investing in a single CAP award that will coordinate a national Climate Smart Extension initiative to connect and extend national and regional Extension programs that create community-based and culturally appropriate approaches to CSAF practices, mitigation of agricultural greenhouse gas emissions, resilient food systems, and nutritional security in rural and urban communities. An additional long-term goal is to bring about environmental justice, particularly for historically underserved communities.
c. Applicants must demonstrate the capacity to use this CAP award to coordinate national and regional Extension programs, including increased collaboration and engagement with the USDA Climate Hub network, to conduct training and professional development of state extension specialists in CSAF, and to communicate CSAF lessons learned that support future effective actions.
d. Applicants must clearly and completely describe how existing and new research outputs, pilot-test outcomes, and modeling results from the full range of scientific sources and relevant organizations and agencies will be translated into lessons learned and incorporated into appropriate participant-relevant implementations.
e. Applicants must describe how they will host and leverage Climate Extension conferences to connect national and regional partners and identify new synergies.
f. The project management plan must describe the formation of an advisory board that is responsible for providing project oversight.
g. Project evaluation plans must be included.
h. Applications must begin their title as “Climate Smart Extension CAP: [full title...]”.
i. Public-private partnerships with letters of support are strongly encouraged.

Climate Smart Extension CAP proposals are expected to describe a national program that coordinates existing Climate Extension programs, identifies synergies, and catalyzes new opportunities in the following areas:

a. **Climate-Smart Agriculture and Forestry**
    1) Fully implement adoption assistance for CSAF practices that support adaptation, mitigation and resilience of plant and animal agricultural systems and agroecosystems to climate change, and incorporate new opportunities and markets for agriculture and forestry
    2) Coordinate national Extension services regarding measurement, monitoring, and mitigation of agricultural greenhouse gas emissions, such as through carbon sequestration and carbon capture practices.

3) Strengthen the food supply chain to enhance food system resilience to climate shocks and improve food and nutrition security.
4) Build on national and regional assessments of CSAF practice implementation.

b. **Climate-Smart Communities**
1) Provide communities with resources to effectively develop and implement climate-smart plans and risk management strategies, to mitigate effects of climate change and improve resilience to environmental, economic, and social disasters exacerbated by climate change.
2) Ensure that historically underserved communities are appropriately engaged and that stewardship and just transitions are fully incorporated into project plans and outcomes.
3) Develop and scale effective training programs to build a climate smart workforce across U.S. communities.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Proposed projects must adhere to the definitions of extension and education for the application's project type as found in *Part II § C.1*.
c. Proposed projects must:
1) Foster trust in CSAF;
2) Include environmental justice, equity, diversity, and inclusion facets of work;
3) Present rationale and metrics for how this work will benefit historically underserved communities: 1) within higher education institutions; 2) within locales directly served by the project; and 3) beyond the life of the project as a result of sustained project impacts.
d. All applications (single function or integrated projects) must include a logic model that:
1) Shows how program resources lead towards identified socio-economic impacts, and
2) Describes how participant and stakeholder feedback will be used to adjust actions.
e. Letters of support from collaborating USDA Climate Hub(s) or extension partners or both are required.
f. All applications (single function or integrated projects) must include a management plan that clearly delineates the roles and responsibilities of each entity involved in the partnership.
g. Applications from and collaborations with minority-serving institutions are encouraged. Projects that engage historically underserved communities and have broader impacts to address current and future challenges are encouraged.

7g. AFRI Commodity Board Co-funding Topics

Table 39: AFRI Commodity Board Co-funding Topics Key Information

Title	Description
Program Code:	A1811
Program Code Name:	AFRI Commodity Board Co-funding Topics
CFDA Number	10.310
Project Type(s):	Research Projects only

Title	Description
Grant Type(s):	a. Standard and FASE (Strengthening Standard and New Investigator) Grants only b. See *Part II § C.2* for requirements specific to FASE Grant applications.
Letter of Intent Deadline	Not applicable
Application Deadline(s)	**2022:** Thursday, ~~May 12~~ July 14, 2022 (5:00 p.m. Eastern Time)
Grant Duration:	36-48 months or 36-60 months, see **project period listed for the specific topic below**
Maximum Award Amount(s):	Including indirect costs: must not exceed the **amount listed for the specific topic below** and are not renewable.
Program Area Priority Contact(s):	a. Dr. Bisoondat (Mac) Macoon, 601-331-6023 or commodityboards@usda.gov b. Dr. John Erickson, (816) 283-6422 or john.erickson@usda.gov c. Dr. Mark Mirando, (202) 445-5575 or mark.mirando@usda.gov

Program Area Priority:
NOTE: Commodity board co-funding topics for FY 2022 will be added in an RFA modification by ~~March 15, 2022~~ May 2, 2022.

NIFA and various commodity boards are seeking to co-fund research projects relevant to the respective commodity board. Each application must address one of the following topics for FY 2022:

1. Characterize natural and induced genetic variation across the diversity of cultivated peanut germplasm using innovative genetic technologies to provide a resource base for peanut genetic improvement focused on traits for biotic and abiotic stress resistance, quality, productivity and other beneficial traits.
   a. Projects covering this commodity board topic must not exceed $500,000 total per project for research projects (including indirect costs) for project periods of three to five years.
   b. **National Peanut Board** representative: DeMarquine' Houston (678) 424-5757 or dchouston@nationalpeanutboard.org

2. Develop support data to improve the accuracy of current system models, increase the usefulness of decision support tools, and improve the overall data systems utilized to measure sustainability for pulse cropping systems. Applications should include development of data that encompass all growing regions with a focus on the carbon footprint, water footprint and/or ecological footprint of pulse crops at the farm level, consider differences between irrigated pulse cropping systems and non-irrigated pulse cropping systems, and incorporate all classes and cultivated varieties of pulse crops.
   a. Projects covering this commodity board topic must not exceed $400,000 total per project for research projects (including indirect costs) for project periods of two to four years.
   b. **American Pulse Association** representative: Todd F. Scholz (208) 882-3023 or toddscholz@usapulses.org

3. Conduct research leading to new information on the molecular interactions between soil- or tuber-borne pathogens and resistant potato lines for diseases of importance in high altitude potato production. The end goal of this research should be better understanding of plant-microbe interactions and the ability to alter them genetically through plant breeding.
   a. Projects covering this commodity board topic must not exceed $500,000 total per project for research projects (including indirect costs) for project periods of three to five years.
   b. ~~**National Potato Promotion Board**~~ **Colorado Potato Administrative Committee** representative: Jim Ehrlich (719) 849-8082 or jehrlich@coloradopotato.org

4. Conduct human clinical trials to determine if individuals who consume walnuts on a regular basis have improved cognitive outcomes.
   a. Projects covering this commodity board topic must not exceed $300,000 total per project for research projects (including indirect costs) for project periods of one to three years.
   b. **California Walnut Commission** representative: Carol Sloan (562) 221-9869 or csloan@walnuts.org

5. Investigate potential benefits of biologicals (biostimulants and biocontrol products derived from natural materials that may improve plant resilience and growth and protection from insects and diseases) in soybean production. Research should quantify soil and plant health responses, potential nutrient loss, nutrient uptake and use efficiencies, as well as operational, financial, and environmental impact on soybean operations.
   a. Projects covering this commodity board topic must not exceed $300,000 total per project for research projects (including indirect costs) for project periods of one to three years.
   b. **United Soybean Board** representative: Keenan McRoberts (636) 681-1249 or kmcroberts@unitedsoybean.org

6. Determine how well the current set of available soil health and carbon sequestration indicators support decisions of soybean producers and identify gaps in indicator ability to meet producer needs and develop specific recommendations for further improvement in indicators and their use.
   a. Projects covering this commodity board topic must not exceed $300,000 total per project for research projects (including indirect costs) for project periods of one to three years.
   b. **United Soybean Board** representative: Keenan McRoberts (636) 681-1249 or kmcroberts@unitedsoybean.org

7. Improve the understanding of barriers and enablers of adopting and/or sustaining the adoption of management practices, such as cover crops and conservation tillage, to improve soil health in the context of weed management challenges and herbicide resistance. These efforts should help to inform the design and implementation of optimal technical and financial assistance programming to support and maintain adoption of these practices.
   a. Projects covering this commodity board topic must not exceed $300,000 total per project for research projects (including indirect costs) for project periods of one to three years.
   b. **United Soybean Board** representative: Keenan McRoberts (636) 681-1249 or kmcroberts@unitedsoybean.org

8. Improve the understanding of genetic, biotic, and abiotic factors impacting cotton seed quality that can lead to improved value and profitability.
   a. Projects covering this commodity board topic must not exceed $300,000 total per project for research projects (including indirect costs) for project periods of one to three years.
   b. **The Cotton Board** representative: Lisa Droke (901) 271-1322 or ldroke@cottonboard.org

9. Improve the climate-change resilience of cotton production systems with improved modeling and byproduct utilization.
   a. Projects covering this commodity board topic must not exceed $300,000 total per project for research projects (including indirect costs) for project periods of one to three years.
   b. **The Cotton Board** representative: Lisa Droke (901) 271-1322 or ldroke@cottonboard.org

10. Develop advanced IPM tools that will integrate with current weed and insect protection in cotton production.
   a. Projects covering this commodity board topic must not exceed $300,000 total per project for research projects (including indirect costs) for project periods of one to three years.
   b. **The Cotton Board** representative: Lisa Droke (901) 271-1322 or ldroke@cottonboard.org

11. Increase the understanding of relationships between soil or plant microbiome and cotton that will enhance cotton's ability to tolerate stress: nutritional, abiotic and/or common pests and pathogens.
   a. Projects covering this commodity board topic must not exceed $300,000 total per project for research projects (including indirect costs) for project periods of one to three years.
   b. **The Cotton Board** representative: Lisa Droke (901) 271-1322 or ldroke@cottonboard.org

12. Develop new cotton breeding tools for superior cotton fiber, yarn, and textiles. Tools could be based on genomics, gene regulatory networks, gene editing, synergistic epistasis of minor-effect alleles, large-scale field trials, new phenotyping strategies or other innovative technologies.
   a. Projects covering this commodity board topic must not exceed $300,000 total per project for research projects (including indirect costs) for project periods of one to three years.
   b. **The Cotton Board** representative: Lisa Droke (901) 271-1322 or ldroke@cottonboard.org

13. Develop and integrate advanced technologies to increase the drought resiliency of cotton varieties and production systems.
   a. Projects covering this commodity board topic must not exceed $300,000 total per project for research projects (including indirect costs) for project periods of one to three years.
   b. **The Cotton Board** representative: Lisa Droke (901) 271-1322 or ldroke@cottonboard.org

14. Develop sorghum-cotton rotational cropping systems that improve farm profitability and environmental sustainability on the southwestern High Plains.
    a. Projects covering this commodity board topic must not exceed $300,000 total per project for research projects (including indirect costs) for project periods of one to three years.
    b. **Sorghum Promotion Research, and Information Board** representative: John Duff (806) 638-5334 or john@sorghumcheckoff.com

Applicants seeking funding through these commodity board co-funded topics must provide a letter of co-funding support from the commodity board directly to the NIFA Program Contact within 60 calendar days after the application submission deadline. When seeking a letter of co-funding support, applicants must submit their entire application to the **respective commodity board listed above and request a letter that specifically indicates that the commodity board supports the application for co-funding.** To obtain a letter of co-funding support or for further questions, please contact the respective commodity board representative listed above. Additionally, applicants must state in the last sentence of their application's Project Summary section that the proposal is submitted in response to the specific commodity board topic listed above.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Applications must provide a letter of co-funding support from the appropriate commodity board as outlined above, either included in the application submission or emailed to commodityboards@usda.gov within 60 calendar days after the application deadline. Failure to do so will result in the proposal being declined.

7h. Rapid Response to Extreme Weather Events Across Food and Agricultural Systems

Table 40: Rapid Response to Extreme Weather Events Across Food and Agricultural Systems Key Information

Title	Description
Program Code:	A1712
Program Code Name:	Rapid Response to Extreme Weather Events Across Food and Agricultural Systems
CFDA Number	10.310
Project Type(s):	a. Extension or Integrated (research and extension) Projects only for **Standard Grants and Strengthening Standard Grants** b. Extension Projects only for **Coordinated Agricultural Project Grants**
Grant Type(s):	a. Standard, FASE (Strengthening Standard), and Coordinated Agricultural Project Grants only b. See *Part II § C.2* for requirements specific to FASE Grant applications.
Letter of Intent Deadline	a. Must be submitted within 14 calendar days after an extreme weather event or disaster; a response with a decision will be sent within 14 calendar days after submission b. Required only for **Standard Grants and Strengthening Standard Grants**; LOI is not required for CAP grants c. LOIs must follow the instructions in Part IV, A and be emailed to afri-rapidresponse@usda.gov
Application Deadline(s)	a. **2022 Standard Grants and Strengthening Standard Grants:** submitted within 21 calendar days after LOI decision response b. **2022 CAP Grants:** Thursday, May 12, 2022 (5:00 p.m. Eastern Time)

Title	Description
Grant Duration:	a. 12 months for **Standard Grants and Strengthening Standard Grants** b. 24 months for **Coordinated Agricultural Project Grants**
Maximum Award Amount(s):	a. Including indirect costs: $300,000 for **Standard Grants and Strengthening Standard Grants** b. Including indirect costs: $3,000,000 for a **Coordinated Agricultural Project Grant**; this program area priority anticipates making up to one CAP award for FY 2022
Program Area Priority Contact(s):	a. Dr. Ashley Mueller, (816) 412-7411 or afri-rapidresponse@usda.gov b. Dr. Amy Ganguli, (816) 642-0813 or amy.ganguli@usda.gov c. Dr. Michelle Colby, (202) 577-8815 or michelle.colby@usda.gov

Program Area Priority:
Climate change exacerbates the risk of extreme weather-related disasters, caused by naturally occurring hazards such as droughts, heat waves, wildfires, tornados, floods, hurricanes, tropical storms, and blizzards, that often disrupt agricultural, forestry, and rangeland production systems. In addition to land degradation, agricultural supply chains are often adversely impacted by these disasters at production, processing, distribution, and consumption stages. Innovative extension and applied research efforts are needed to alleviate the impacts of these disasters across the food and agricultural system. These strategies should help buffer effects from disasters and ensure the availability of an accessible, safe, nutritious, affordable, and abundant food supply. Funded projects are expected to provide solutions that may include trainings, communication strategies, tools and technologies, food supply logistics, and climate-smart practices that can be rapidly adopted by various end-users, as well as explain how adoption potential of proposed solutions will be measured. Proposals are encouraged to integrate youth and adult volunteer development aspects by leveraging existing extension networks and outreach programs, including 4-H and positive youth development efforts. Furthermore, proposals are encouraged to support or add value to existing educational materials regarding disasters and naturally occurring hazards, collaborating with the Extension Disaster Education Network (EDEN) to ensure efforts are not duplicated.

This program area priority is designed to rapidly deploy strategies and fill knowledge and information gaps to protect the nation's food and agricultural supply chains and the people who support them during and after weather-related disasters. All submissions must directly address effects associated with an extreme weather event or disaster. The National Weather Service, Farm Service Agency, and FEMA may have information and/or data to justify a direct need for rapid response activities.

Applications must address one or more of the following (order does not indicate importance):

a. Agroecosystem Resilience
    1) Efficacy assessments and innovative strategies that can minimize the impacts of weather-related disasters on agroecosystems.
    2) Methods to mitigate contamination of ground and/or surface waters, air quality, or damage to soils caused by disasters.
    3) Incorporation of new technologies to enhance the resilience of agricultural production

systems during and after disasters. This may include implementation of technologies that use artificial intelligence, autonomy (e.g., unmanned vehicles, drones, robotics, and connected sensors), and the internet of things.

b. Agricultural Commodity and Nutrition Security
   1) Development and implementation of plans to ensure the health and security of livestock during and after natural disasters (e.g., evacuation and humane depopulation procedures, access to shelter, uncontaminated feed, clean water, and veterinary services).
   2) Strategies to support the maintenance, salvage, processing, transport, and storage of agricultural commodities affected by disasters, as well as the safe disposal of spoiled products.
   3) Training programs to reduce potential contamination or dispersal of pathogens associated with contaminated food throughout the production system, including storage, processing, and transport.
   4) Strategies to ensure all children, youth, and adults have access to safe, nutritious, abundant, and affordable food during and after disasters.
c. Health, Well-Being, and Safety
   1) Evaluation of increased risks and exposure to structural, electrical, and chemical hazards associated with disasters and the development of mitigation strategies for agricultural production and food processing environments.
   2) Best practices and training to address safe operations and reentry protocols for agricultural workers, including any additional measures for youth and workers with disabilities.
   3) Strategies to address the health, well-being, and safety of children, youth, and adults affected by disasters.

This program area seeks applications that:

a. Focus on critical and urgent solutions in rapid response to disaster impacts on the nation's food and agricultural systems.
b. Clearly describe short-term deliverables (within 3 months of award receipt).
c. Clearly define the geographic scope of the project as related to the weather-related event or disaster.

In addition to Standard Grants and Strengthening Standard Grants, the program area priority is soliciting applications to fund a single **Coordinated Agricultural Project (CAP) Grant for Rapid Response to Extreme Weather Events Across Food and Agricultural Systems**.

a. During and after disasters, there is a need to develop, in real-time, new resources or add value to existing educational materials that support food and agricultural systems, farmers and ranchers, workers, families, youth, and communities. The Extension CAP priority aims to rapidly deploy strategies and fill knowledge and information gaps to protect the nation's food and agricultural supply chains and the people who support them during and after weather-related, federally declared disasters or State and County disaster designations. NIFA anticipates investing in an award to coordinate a national, "real-time" extension response grant program.
b. Applicants applying to coordinate this extension response grant program must have the capacity to promptly accept and review proposals, award projects for rapid initiation at subaward institutions, and provide post-award management including project oversight

and reporting. In a project management plan, applicants must describe management of the grant program and how they will collaborate with EDEN. Applicants may contact the EDEN executive officers during proposal formulation to solicit guidance on how best to interface with EDEN on the project and to secure a letter of support as appropriate.

c. Applications must begin their title as "**Extension CAP:** [full title…]".
d. Public-private partnerships with letters of support are strongly encouraged.

Program Area Priority Additional Information:

a. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
b. Projects focusing on species and commodities that are important to historically underserved farmers and ranchers or small- or medium-sized farms or ranches are encouraged.
c. The Project Narrative for standard and standard strengthening applications **must not exceed a total of 7 pages** and CAP applications **must not exceed a total of 18 pages.** All applications must meet all other requirements in *Part IV*. If submitting an integrated Research and Extension application, please refer to the specific eligibility requirements (see *Part III § A*) and specific content requirements for integrated applications. Applications that do not follow these requirements will not be reviewed.
d. Application review and processing will be expedited to ensure rapid project start-up.
e. A justification of how the project addresses a critical and urgent stakeholder need must be included in the Project Narrative of the full application.
f. There must be a high likelihood that results of the proposed project will be immediately deployed.
g. Applications from and collaborations with minority-serving institutions, small to mid-sized institutions, and/or institutions within EPSCoR states are encouraged.

7i. Regional Innovation and Demonstration of Climate-smart Agriculture for Future Farms (CAFF)

Table 41: Regional Innovation and Demonstration of Climate-smart Agriculture for Future Farms (CAFF) Key Information

Title	Description
Program Code:	A1556
Program Code Name:	Regional Innovation and Demonstration of Climate-smart Agriculture for Future Farms (CAFF)
CFDA Number	10.310
Project Type(s):	Integrated Projects only
Grant Type(s):	a. Standard and FASE (Strengthening Standard) Grants only b. See *Part II § C.2* for requirements specific to FASE Grant applications.
Letter of Intent Deadline	Not applicable
Application Deadline(s)	**2022:** Thursday, October 6, 2022 (5:00 p.m. Eastern Time)

Title	Description
Grant Duration:	Up to 48 months for **Standard Grants and Strengthening Standard Grants**
Maximum Award Amount(s):	Including indirect costs: $4,000,000 for **Standard Grants and Strengthening Standard Grants**
Program Area Priority Contact(s):	a. Dr. Ganesh Bora, (816) 489-0944 or ganesh.bora@usda.gov b. Dr. Amer Fayad, (816) 894-7228 or amer.fayad@usda.gov c. Dr. Steven Smith, (202) 445-5480 or steven.i.smith@usda.gov d. Dr. Ann Stapleton, (816) 274-1942 or ann.stapleton@usda.gov e. Dr. Adam Wilke, (816) 398-5277 or adam.wilke@usda.gov f. Dr. Diomides Zamora, (202) 590-6049 or diomides.zamora@usda.gov

Program Area Priority:
The Regional Innovation and Demonstration of Climate-smart Agriculture for Future Farms (CAFF) program priority area will establish an agricultural testbed and demonstration farm for climate smart agriculture or forestry. The established demonstration farm will incorporate animal, plant, or combined animal and plant production (including aquaculture) systems or forestry systems with advanced precision agricultural technologies to develop and implement climate-smart agricultural or forestry (CSAF) practices that will reduce emission of greenhouse gases (GHG), create positive economic, environmental, and social impact and address unique regional production systems in the United States. Multidisciplinary and multifunctional teams of scientists, educators, and/or extension staff will be needed to successfully implement these projects. Public-private partnerships are encouraged. The long-term goals of this program area priority include sustainable agricultural and forestry production systems, resilient food or forestry supply chains, value-added products, enhanced socio-economic opportunities, and thriving rural communities.

The purpose of this program area priority is to establish a demonstration farm and testbed for applied research, education, and extension on animal, plant or combined animal and plant production systems that employ smart technologies and management practices to ensure sustainable CSAF production practices. Use of precision technologies such as digital agriculture, automation, artificial intelligence (AI), machine learning (ML), internet-of-things (IoT), unmanned-aerial systems (UAS), advanced genomics and phenotyping, in combination with animal or plant production systems, is required. While a holistic systems approach is expected, projects must be accomplished within the scope of program resources. Applicants are encouraged to develop and deliver methods and practices that can be scaled to various production systems and transferred across regions to facilitate adoption of CSAF practices and mitigate emission of GHG while also ensuring profitability for farmers and ranchers.

This program area priority invites applications for integrated projects that include two or more of the following priorities to study regional animal and/or plant production systems:

a. Extension activities that use testbeds, demonstration farms, or on-farm research to deliver science-based knowledge, informal education programs, or decision support tools to producers to make informed decisions and enhance their use of CSAF practices to reduce GHG emissions. Extension activities must be accessible to producers in the region,

recognize the value of indigenous traditional ecological knowledge and include historically underserved farmers and ranchers.

b. Applied research on animal or plant production systems on a demonstration farm, including advanced genomics and phenotyping combined with the use of smart technologies such as automation, robots, unmanned aerial systems, sensors or IoT to securely gather quality data in real time and use data for AI and/or ML to mitigate GHG emission in practice.
c. Formal or non-formal educational activities on the demonstration farm to develop human capital or train the future workforce in CSAF practices such as experiential learning opportunities; K-12, college-level education programs, 4-H, FFA, and other Positive Youth Development programs; innovative teaching methodologies; or faculty development.

Program Area Priority Additional Information:

a. Regional balance among projects in this program area priority will be one of the factors considered in review and funding of the grants.
b. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.
c. Applications from and collaborations with minority-serving institutions are encouraged.
d. Projects focusing on species and commodities that are important to historically underserved farmers or small and medium-sized farms are encouraged.
e. All applications must include a logic model that:
    1) shows how program resources lead to sustainable production systems, resilient food or forestry supply chains, value-added products, enhanced socio-economic opportunities, or thriving rural communities; and
    2) describes how participant and stakeholder feedback will be used to design and implement projects.
f. All applications must include a management plan that clearly delineates the roles and responsibilities of each entity involved in the project. It will be important to include plans for managing the demonstration farm/testbeds after the project period.

7j. Center of Excellence for Meat and Poultry Processing and Food Safety Research and Innovation (MPPFSRI)

Table 40: Center of Excellence for Meat and Poultry Processing and Food Safety Research and Innovation (MPPFSRI) Key Information

Title	Description
Program Code:	A1731
Program Code Name:	Center of Excellence for Meat and Poultry Processing and Food Safety Research and Innovation (MPPFSRI)
CFDA Number	10.310
Project Type(s):	Integrated (Research and Extension) Projects only
Grant Type(s):	c. Standard and FASE (Strengthening Standard) Grants only d. See *Part II § C.2* for requirements specific to FASE Grant applications.
Letter of Intent Deadline	Not applicable

Title	Description
Application Deadline(s)	**2022:** November 3, 2022
Grant Duration:	Up to 48 months for **Standard Grants and Strengthening Standard Grants**
Maximum Award Amount(s):	Including indirect costs: Up to $5,000,000 for **Standard Grants and Strengthening Standard Grants**
Program Area Priority Contact(s):	g. Dr. Kamilah Grant, (352) 805-8872 or kamilah.grant@usda.gov h. Dr. Keith Harris, (816) 916-0332 or keith.harris@usda.gov i. Dr. Hongda Chen, (202) 445-5582 or hongda.chen@usda.gov j. Dr. Mark Mirando, (202) 445-5575 or mark.mirando@usda.gov

Program Area Priority:
The Center of Excellence for Meat and Poultry Processing and Food Safety Research and Innovations (MPPFSRI) program priority area will incorporate basic and applied science, and engineering in meat and poultry processing and food safety-related disciplines to promote technological innovation and lower barriers to entry for the industry. Processing a living animal into consumable products is a complex enterprise with multiple risk elements. Handling, harvesting, manipulation, deboning, cutting, packaging, distribution, and storage require multiple decision points in very short timeframes. Variability of carcass characteristics within each species requires adaptability in processing. The complexity of these decisions increases risks for employee injury, meat safety compromise, food safety, increased processing time, and meat quality loss. Technology can help reduce the product and process risk associated with animal processing industries by automating the least safe jobs and using data and digitalization to provide more visibility and enhanced food safety across the processing chain to better respond to complex decisions. Research is needed to develop innovative technologies that can address risk management and food safety and should be focused on automation and data needs.

Innovations in sensing, artificial intelligence (AI), machine learning, internet-of-things (IoT) robotics, automation, and sensory controls for meat product quality and food safety present opportunities for providing scale appropriate solutions to these challenges. The goal of the MPPFSRI program is to promote an innovative approach that promotes food safety and leads to lower barriers of entry via publicly accessible research and development. Meat and poultry processing is technically and biologically a complex process and processors need access to new and emerging innovative practices and technologies to supply the demand from traditional and niche market opportunities. USDA-NIFA will invest an estimated $5 million in research and extension to help independent business owners, entrepreneurs, producers, and other groups, such as cooperatives and worker associations, support food safety, new processing capacity, and/or expanded existing processing capacity. Multidisciplinary and multifunctional teams of scientists, business practitioners, and/or extension staff will be needed to successfully implement these projects. Public-private partnerships are encouraged. Applicants should develop and deliver innovations that can be scaled to various processing production systems and transferred across regions to facilitate adoption of innovative meat and poultry processing and food safety practices.

All applications must be for integrated (Research and Extension) projects that address the following priorities to produce research and innovation in meat and poultry processing and food safety, and **MUST** include a request for consideration of Center of Excellence designation (Eligibility Information, *Part III § D* and Application Review Requirements, *Part V § C*):

d. Research based on foundational knowledge of meat and poultry processing and food safety combined with the use of advanced manufacturing technologies such as automation, robots, sensors or IoT to securely gather quality data in real time and use data for AI and/or machine learning to increase innovation in practice. Worker safety, food safety, and process efficiency should be emphasized. Areas of innovation that could be supported include, but are not limited to:
    - Advanced manufacturing to develop scale-neutral technologies for large-, medium-, or small-processing plants.
    - Machine vision and robotic automation for remote worker control of equipment, increasing worker safety and food safety.
    - Use of robotics or imaging to obtain precision cuts of meat with higher value and minimize waste and trimming.
    - Robotics to obtain major, higher value cuts of meat only (faster processing pace to minimize backlog of animals ready to harvest).
    - Automation to minimize person-to-person contact during a pandemic or labor shortage.
    - Making technologies affordable for small- and medium-sized processing plants.
    - AI, machine learning, data science components, facial recognition, ID tracing, image analysis for grading and food safety.

e. Extension activities that use demonstration sites, or on-site research to deliver science-based knowledge, informal education programs, or decision support tools to processors to make informed decisions and enhance research and innovation in meat and poultry processing facilities. Extension activities must be accessible to producers in the region, recognize the value of traditional and indigenous knowledge and include historically underserved farmers and ranchers. The application must clearly state how the project will track or increase the chance of technology adoption, if applicable. Areas of extension that could be supported include, but are not limited to:
    - Regional partnerships with regional processing industry, state, and producer communities.
    - Technology transfer to fast-track innovation adoption by industry through public-private partnerships, Small Business Innovation Research (SBIR) programs, and other effective programs.
    - Engagement with regional workforce development and technical assistance efforts to amplify impacts of technological innovations across regional meat and poultry processing facilities.
    - Transfer knowledge to ensure worker safety and food safety as well as process efficiency.

Program Area Priority Additional Information:

g. Requests exceeding budgetary guidelines will not be reviewed. Unless otherwise stated, grants are not renewable.

h. Applications from and collaborations with minority serving institutions, small to mid-sized institutions, and/or institutions within the EPSCoR states are welcome in this program area priority.
i. Projects focusing on species that are important to historically underserved farmers or small- and medium-sized farms are welcome in this program area priority.
j. All applications are required to include a brief justification at the end of their Project Narratives and within the page limits provided for Project Narratives, describing how they meet the standards for a Center of Excellence, based on the criteria described for Centers of Excellence in *Part IV § C* of this RFA, as authorized in the 2014 Farm Bill.
k. Applications must include a plan to share results across regions to increase research and innovation.
l. All applications must include a logic model that:
    1) shows how program resources lead to resilient food supply chains, enhanced socio-economic opportunities, and/or thriving rural communities; and
    2) describes how participant and stakeholder feedback will be used to design and implement projects.
m. All applications must include a management plan that clearly delineates the roles and responsibilities of each entity involved in the project.
n. In ranking of the applications, the panel will consider regional balance and coverage of the diversity of meat and poultry processing industries.

PART II. AWARD INFORMATION

A. Available Funding

The anticipated amount available for the AFRI Foundational and Applied Science RFA in FY 2022 is approximately $300,000,000. For 2022, funding from FY 2022 and FY 2023 appropriations will be used. The anticipated amount available to support the AFRI program is approximately $435 million for FY 2022 and $435 million for FY 2023.

This RFA is being released prior to the passage of an appropriations act for FY 2022 and FY 2023. Enactment of additional continuing resolutions or an appropriations act may affect the availability or level of funding for this program in FY 2022 and FY 2023.

Of the total amount available to make awards for the AFRI program, no less than 30 percent will be made available to fund integrated research, education, and extension projects. Of the AFRI funds allocated to research activities, no less than 60 percent will be directed toward grants for fundamental (or basic) research and 40 percent toward grants for applied research. Of the AFRI funds allocated to fundamental research, not less than 30 percent will be directed toward research by multidisciplinary teams. It is expected that no less than 15 percent of the funds will be made available for Food and Agricultural Science Enhancement (FASE) Grants, and no more than two percent of the funds available for fundamental research will be made available for Equipment Grants (see *Part II § C* for information about FASE Grants including Equipment Grants).

Of the anticipated approximately $300 million total available from FY 2022 and FY 2023 to support the program areas in this RFA, no less than 11.25% will be made available for Strengthening grant types under the FASE program.

The funds will be awarded through a grant for performance periods of up to five years. NIFA may choose to issue a grant on a continuation basis. A continuation award is an award instrument by which NIFA agrees to support a specified level of effort for a predetermined period of time with a statement of intention to provide additional support at a future date, provided that performance has been satisfactory, appropriations are available for this purpose, and continued support would be in the best interest of the federal government and the public. USDA is not committed to fund any particular application or to make a specific number of awards.

The Automated Standard Application for Payments, operated by the Department of Treasury, Bureau of Fiscal Service, is the designated payment system for awards resulting from this RFA.

B. Application Restrictions

NIFA will evaluate applications using the criteria described in *Part V*. Application for FY 2022 is limited to the following applications types:

1. *New application*: New applications will be evaluated using the criteria described in *Part V* and are subject to the due dates herein (see *Appendix III* for definition).
2. *Resubmitted application*: Resubmitted applications must include the respond to the previous review panel summary and are subject to the same criteria and due dates herein. Resubmitted applicants must enter the NIFA-assigned proposal number of the previously submitted application in the *Federal Field (Field 4)* on the application form (see *Appendix III* for definition).

3. *Renewal application*. Renewal applications must contain the same information as required for new applications and must contain a p*rogress report*. The progress report must include the implementation of the data management plan (DMP) of the previously funded project. Renewal applications are subject to the same criteria and due dates herein. Applicants submitting a renewal application must enter the NIFA-assigned proposal number of the previously approved application in the *Federal Field (Field 4)* on the application form (see *Appendix III* for definition).

C. Project and Grant Types

The following describes the types of *projects* or *grants* that are eligible for funding:

1. **Project Types**. Applicants must propose one of the AFRI project types specified within the relevant program area descriptions in *Part I § C*. Only project types specifically solicited under each program area or program area priority described in *Part I § C* will be considered for review. A detailed description of the project types (Research, Education, Extension, and Integrated Research, Education and/or Extension) available across all AFRI RFAs is in the "AFRI Project Types" PDF in the attachments list on the AFRI RFA Resources page.

2. **Grant Types.** Applicants must select the appropriate AFRI grant type specified within the relevant Program Area Descriptions in *Part I § C*. Only grant types specifically solicited under each program area or program area priority described in *Part I § C* will be considered for review. A detailed description of the grant types (Standard Grants, Coordinated Agricultural Projects, Conference Grants, Collaborative Grants, and FASE Grants) available across all AFRI RFAs is in the "AFRI Grant Types" PDF in the attachments list on the AFRI RFA Resources page.

D. Ethical Conduct of Funded Projects

In accordance with sections 2, 3, and 8 of 2 CFR Part 422, institutions that conduct USDA-funded extramural research must foster an atmosphere conducive to research integrity, bear primary responsibility for prevention and detection of research misconduct, and maintain and effectively communicate and train their staff regarding policies and procedures. In the event an application to NIFA results in an award, the Authorized Representative (AR) assures, through acceptance of the award that the institution will comply with the above requirements. Award recipients must, upon request, make available to NIFA the policies, procedures, and documentation to support the conduct of the training. See Responsible and Ethical Conduct of Research for further information.

E. Partnership Opportunities

Opportunity to request an additional $150,000 for applications that include specific types of partnerships under the following program area priorities as specified in the key information tables in *Part I § C*: A1141, A1152, A1181, A1201, A1221, A1251, A1332, A1343, A1344, A1364, A1401, A1411, A1451, A1511, A1521, A1531, A1541, A1551, A1641, and A1651.

1. Applications that includes significant collaboration with 1) small and mid-sized or minority-serving degree-granting institutions that are not among the most successful universities and colleges for receiving Federal funds (see "Table 1 Most Successful Institutions" in the attachments list on the AFRI RFA Resources page); 2) State Agricultural Experiment Stations or degree-granting institutions eligible for USDA

Established Program to Stimulate Competitive Research (EPSCoR) funding, and/or 3) international partners will be funded up to $150,000 above the listed budget maximum for non-partnership opportunity applications as specified in the key information table for the program area priority (i.e., up to $800,000 for a $650,000 listed regular application budget maximum).

2. Applications that include such partnerships must begin their title as **"PARTNERSHIP**: [full title…]" If a program area priority has title requirements, PARTNERSHIP should be added to the end of the required phrase (i.e., DSFAS PARTNERSHIP: [full title…]). The partnership team MUST BE reflected among the listed Project Director and Co-Project Director(s).
3. A minimum of $150,000 of the budget MUST BE allocated to the institution(s) included as partner(s).
4. Standard grant applications meeting these partnership criteria are eligible, as well as Strengthening Standard grant applications partnering with any organization (i.e., Strengthening eligible institutions may apply as the lead institution).

Note: Applications submitted for U.S.-Ireland Tripartite Collaborative grants in A1201, A1221, A1251, A1451, A1531, and A1541 are ineligible for this partnership opportunity.

PART III. ELIGIBILITY INFORMATION

A. Eligibility Requirements

Applicants for AFRI must meet all the requirements discussed in this RFA. Failure to meet the eligibility criteria by the application deadline may result in exclusion from consideration or, preclude NIFA from making an award. For those new to Federal financial assistance, NIFA's Grants Overview provides highly recommended information about grants and other resources to help understand the Federal awards process.

Eligibility is linked to the project type as specified below.

1. **Research, Education or Extension Projects**
   Eligible applicants for single-function Research, Education or Extension Projects include:
   a) State Agricultural Experiment Station;
   b) colleges and universities (including junior colleges offering associate degrees or higher);
   c) university research foundations;
   d) other research institutions and organizations;
   e) Federal agencies;
   f) national laboratories;
   g) private organizations or corporations;
   h) individuals who are U.S. citizens, nationals, or permanent residents; and
   i) any group consisting of two or more entities identified in a) through h).

   Eligible institutions do not include foreign and international organizations.

2. **Integrated Projects**
   Eligible applicants for Integrated Projects include:
   a) colleges and universities;
   b) 1994 Land-Grant Institutions; and
   c) Hispanic-serving agricultural colleges and universities (see NIFA's Hispanic-Serving Agricultural Colleges and Universities page).

   For item a) under Integrated Projects, the terms "college" and "university" mean an educational institution in any state which
   a) admits as regular students only persons having a certificate of graduation from a school providing secondary education, or the recognized equivalent of such a certificate;
   b) is legally authorized within such state to provide a program of education beyond secondary education;
   c) provides an educational program for which a bachelor's degree or any other higher degree is awarded;
   d) is a public or other nonprofit institution; and
   e) is accredited by a nationally recognized accrediting agency or association.

   A research foundation maintained by a college or university is eligible to receive an award under this program.

3. **Food and Agricultural Science Enhancement Grants**
   Part II § C.2 contains the eligibility details for Food and Agricultural Science Enhancement (FASE) Grants. Note that under FASE program, New Investigator, Strengthening Standard, Strengthening Conference, Seed, Equipment and Sabbatical Grants are solicited in this RFA.

Applicants must respond to the program area priorities and deadlines found in *Part I § C*. Grant recipients may subcontract to organizations not eligible to apply provided such organizations are necessary for the conduct of the project. Failure to meet an eligibility criterion by the application deadline may result in the application being excluded from consideration or, even though an application may be reviewed, will preclude NIFA from making an award (see *Part III § B*).

Duplicate or Multiple Submissions – ~~duplicate or multiple submissions is not allowed~~ submission of duplicate or predominantly overlapping applications is not allowed. NIFA will disqualify both applications if an applicant submits ~~duplicate or multiple submissions~~ multiple applications that are duplicative or substantially overlapping to NIFA programs within the same fiscal year. For those new to Federal financial assistance, NIFA's Grants Overview provides highly recommended information about grants and other resources to help understand the Federal awards process.

B. Request for Determination of Status

1. Minority-Serving Institution

If an institution is applying for a Strengthening Grant (see *Part II § C.2*) and wants the Secretary to consider a group, beyond one included in the minority definition (see *Appendix III*), then documentation (see below) must be submitted as part of the requestor's LOI (if required) and the full application package (*Part IV § C*) by the applicable program area or program area priority deadline. The Secretary of Agriculture (or designated individual) will use the information in the documentation to determine whether the group or groups identified are qualified as a minority group for the purpose of receiving a Strengthening Grant under the FASE program (for Strengthening Grants information, refer to the "AFRI Grant Types" PDF in the attachments list on the AFRI RFA Resources page).

Documentation for the request for determination as a minority-serving institution must include the following and be provided in the order specified below:

a. A description of each minority group being submitted for determination;
b. Data or studies supporting this group's designation as a minority group; and
c. Data indicating that enrollment of the minority group(s) exceeds 50 percent of the total enrollment at the academic institution, including graduate and undergraduate and full-and part-time students.

2. Multi-Campus Institution

All institutions grouped under one main campus as listed in Table 1 following Appendix III, unless located in an Established Program to Stimulate Competitive Research (EPSCoR) state (listed in *Part II § C.2*), are excluded from eligibility for all strengthening

funds. However, if any campus within a multi-campus listing can provide information demonstrating that it is administratively independent or has an independent accreditation, then the institution may petition for an exemption to this rule and request eligibility for strengthening funds. The LOI (if required) and the application must include a letter indicating how the institution is independent of the main campus, either through accreditation or administration, how the institution is eligible as a small and mid-sized or minority-serving institution due to enrollment, and total federal funds received for science and engineering research and development. The letter must be signed by the Authorized Representative (AR).

C. Cost Sharing or Matching

Match Required – Applicants **MUST** provide matching contributions on a dollar-for-dollar basis for all Federal funds awarded under AFRI. Matching funds requirements for AFRI programs included in this RFA may be found at 7 U.S.C. 3157 (b)(9)(a-C). If an **applied Research** (see *Appendix III*) or **Integrated Project with an applied research component**, is commodity-specific and not of national scope, the grant recipient is required to match the USDA funds awarded on a dollar-for-dollar basis from non-federal sources with cash and/or in-kind contributions. NIFA may waive the matching funds requirement for a grant if one of the following applies:

1. The results of the project, while of particular benefit to a specific agricultural commodity, are likely to be applicable to agricultural commodities generally; or
2. The project involves a minor commodity, the project deals with scientifically important research, and the grant recipient is unable to satisfy the matching funds requirement.

For Equipment Grants. The amount of Federal funds provided may not exceed 50 percent of the cost of the equipment acquired using funds from the grant, or $50,000, whichever is less. Grantees are required to match 100 percent of Federal funds awarded from non-Federal sources. NIFA may waive all or part of the matching requirement if all three of the following criteria are met:

1. application is from a college, university, or research foundation maintained by a college or university that ranks in the lowest one third of such colleges, universities, and research foundations on the basis of Federal research funds received (see "Table 2 Least Successful Institutions" in the attachments list on the AFRI RFA Resources page);
2. the equipment to be acquired costs no more than $25,000; and
3. the equipment has multiple uses within a single research project or is usable in more than one research project. To be considered for this waiver, the budget justification (see *Part IV § C*) must include a letter signed by the institution's AR addressing the noted criteria.

D. Centers of Excellence

Pursuant to Section 7214 of the Agricultural Act of 2014 (Pub. L. 113-79) , NIFA will recognize and prioritize COE applicants that carry out research, extension, and education activities that relate to the food and agricultural sciences. A COE is composed of one or more of the following entities that provide financial or in-kind support to the COE.

1. State agricultural experiment stations.
2. Colleges and universities.
3. University research foundations.

4. Other research institutions and organizations.
5. Federal agencies.
6. National laboratories.
7. Private organizations, foundations, or corporations.
8. Individuals; or
9. Any group consisting of two or more of the entities described in (1) through (8).

COE designation is available only for the **standard grant** and the **Coordinated Agricultural Project (CAP) grant** applications submitted to the program areas or program area priorities in the Foundational and Applied Science and Sustainable Agricultural Systems RFAs. If applicable, *Part IV § C* contains additional requirements for COE consideration.

PART IV. APPLICATION AND SUBMISSION

A. Letter of Intent

If a program area or program area priority within this RFA requires a LOI (LOI), then a LOI is a prerequisite for submission of an application. Refer to the Program Area Descriptions beginning in *Part I § C* for LOI deadlines for a specific program area or program area priority. For detailed guidance on LOI submission, see "AFRI Letter of Intent Instructions" in the attachments list on the AFRI RFA Resources page.

B. Method of Application

Applicants must apply to this RFA electronically; no other method or response is accepted. The electronic application for this RFA and additional resources are available on Grants.gov and Grants 101. **Table 41** provides instructions on how to obtain an electronic application. **Part III** of the NIFA Grants Application Guide contains detailed information regarding the Grants.gov registration process. The NIFA Grants Application Guide is contained in the specific funding opportunity package or a sample of the guide can be found here. When applying for a NIFA award, it is important to reference the version of the guide that is included in the specific funding opportunity application package.

Table 42. Steps to Obtain Application Materials

Steps	Action
Step One: Register	*New Users* to Grants.gov must register early with Grants.gov prior to submitting an application (Register Here).
Step Two: Download Adobe	Download and Install Adobe Reader (see Adobe Software Compatibility for basic system requirements).
Step Three: Find Application	Using this funding opportunity number **USDA-NIFA-AFRI-009003**, search for application here: Opportunity Package.
Step Four: Assess Readiness	Contact an AR prior to starting an application to assess the organization's readiness to submit an electronic application.

Table 43: Help and Resources

Grants.gov Support	NIFA Support
Grants.gov Online Support Telephone support: 800-518-4726 Toll-Free or 606-545-5035 Email support: support@grants.gov Self-service customer-based support: Grants.gov iPortalgrantapplicationquestions@usda.gov Key Information: Customer service business Hours 24/7, except federal holidays.	Email: grantapplicationquestions@usda.gov Key Information: Business hours: Monday thru Friday, 7a.m. – 5p.m. ET, except federal holidays

C. Content and Form of the Application

The application guide is part of the corresponding application package for this RFA. The RFA overrides the application guide if there is a discrepancy between the two documents. NIFA will accept subsequent submissions to an application until the application deadline. However, applicants that do not meet the application requirements, to include partial applications, risk being excluded from NIFA's review. NIFA will assign a proposal number to all applications that meet the requirements of this RFA. Applicants must refer to the proposal number when corresponding with NIFA. **Table 43** outlines other key instructions for applicants.

Table 44: Key Application Instructions

Instruction	References **(All references are to the Application Guide)**
Attachments must be in a portable document format (PDF) format.	Part IV
Check the manifest of submitted files to verify attachments are in the correct format.	Part IV
Conduct an administrative review of the application before submission.	Part IV
Follow the submission instructions.	Part V
Provide an accurate email address, where designated, on the SF-424 R&R.	Part V
Contact the Grants.gov helpdesk for technical support and keep a record of the correspondence.	N/A
Contact NIFA if applicant does not received correspondence from NIFA regarding an application within 30 days of the application deadline.	N/A

AFRI Specific Application Instructions. Application and submission information including page limits and narrative font sizes for AFRI Foundational and Applied Science RFA applications are available in the "FY 2022 Foundational and Applied Science RFA Additional Information for Part IV, C" PDF in the attachments list on the AFRI RFA Resources page.

We recommend that you conduct an administrative review of the application before submission of it via Grants.gov to ensure that it complies with all preparation instructions. An application checklist is included in Part VII of the NIFA Grants.gov Application Guide to assist with this review.

You should check the application for completeness. The application should be checked for the following required items, which must include:

1. Project Summary/Abstract
2. Project Narrative
3. Bibliography & References Cited
4. Logic Model for Integrated Projects (if applicable)
5. Management Plan for Integrated Projects (if applicable)
6. Data Management Plan
7. Facilities & Other Resources
8. Curriculum Vitae
9. Conflict of Interest Lists
10. Current and Pending Support
11. Budget
12. Budget Justification
13. Felony and Tax Certification Form (if applicable)

This is not an exhaustive list of required items; it only serves to highlight items that may be overlooked. **Failure to include any of the three critical required documents of Project Summary/Abstract, Project Narrative, or Bibliography & References Cited sections as PDF attachment will result in the application not being reviewed or considered for funding by NIFA.**

We send email correspondence to the AR regarding the status of submitted applications. We strongly encourage you to provide accurate email addresses, where designated, on the SF-424 R&R Application for Federal Assistance.

If the AR has not received correspondence **from NIFA** regarding a submitted application within 30 days of the established deadline, contact the Program Contact identified in *Part I § C* and request the proposal number assigned to the application. **Failure to do so may result in the application not being considered for funding by the peer review panel. Once the application has been assigned a proposal number, you should cite this number on all future correspondence.**

D. Funding Restrictions

Indirect Cost (IDC) not to exceed 30 percent of Total Federal Funds Awarded (TFFA) of the recipient. Section 1462(a) and (c) of the National Agricultural Research, Extension, and Teaching Policy Act of 1977 (NARETPA) limits IDC for the overall award to 30 percent of Total Federal Funds Awarded (TFFA) under a research, education, or extension grant. The maximum IDC rate allowed under the award is determined by calculating the amount of IDC using:

1. the sum of an institution's negotiated indirect cost rate and the indirect cost rate charged by sub-awardees, if any; or
2. 30 percent of TFFA.

The maximum allowable IDC rate under the award, including the IDC charged by the sub-awardee(s), if any, is the lesser of the two rates.

If the result of number one is the lesser of the two rates, the grant recipient is allowed to charge the negotiated IDC rate on the prime award and the sub-award(s), if any. Any sub-awards would be subject to the sub-awardee's negotiated IDC rate. The sub-awardee may charge its negotiated IDC rate on its portion of the award, provided the sum of the IDC rate charged under the award by the prime awardee and the sub-awardee(s) does not exceed 30 percent of the TFFA.

If the result of number two is the lesser of the two rates, then the maximum IDC rate allowed for the overall award, including any sub-award(s), is limited to 30 percent of the TFFA. That is, the IDC of the prime awardee plus the sum of the IDC charged by the sub-awardee(s), if any, may not exceed 30 percent of the TFFA.

In the event of an award, the prime awardee is responsible for ensuring the maximum indirect cost allowed for the award is not exceeded when combining IDC for the Federal portion (i.e., prime and sub-awardee(s)) and any applicable cost-sharing (see 7 CFR 3430.52(b)). Amounts exceeding the maximum allowable IDC are considered unallowable. See sections 408 and 410 of 2 CFR 200.

Successful applicants must not use grant funds awarded under the authority of this RFA to renovate or refurbish research, education, or extension space; purchase or install fixed equipment in such space; or to plan, repair, rehabilitate, acquire, or construct buildings or facilities.

PART V. APPLICATION REVIEW REQUIREMENTS

A. NIFA's Evaluation Process

NIFA evaluates each application in a two-part process. First, we screen each application to ensure that it meets the administrative requirements set forth in this RFA. All administrative requirements must be met in order for the application to proceed to the next level of review. Second, a scientific peer-review process will be used to technically evaluate applications that have met the administrative requirements using a review panel **(see** NIFA Peer Review Process).

Scientific Peer Review Process:

NIFA selects reviewers for the review panel based upon their training and experience in relevant scientific, extension, or education fields, taking into account the following factors:

1. the level of relevant formal scientific, technical education, or extension experience of the individual, as well as the extent to which an individual is engaged in relevant research, education, or extension activities.
2. the need to include experts from various areas of specialization within relevant scientific, education, or extension fields.
3. the need to include other experts (e.g., producers, range or forest managers/operators, and consumers) who can assess relevance of the applications to targeted audiences and to program needs.
4. the need to include experts from a variety of organizational types (e.g., colleges, universities, industry, state and Federal agencies, and private profit and non-profit organizations) and geographic locations.
5. the need to maintain a balanced composition with regard to minority and female representation and an equitable age distribution; and
6. the need to include reviewers who can judge the effective usefulness of each application to producers and the general public.

After each peer review panel has completed its deliberations, the responsible program staff of NIFA will recommend that your project is either approved for support from currently available funds or declined due to insufficient funds or unfavorable review.

NIFA reserves the right to negotiate with the PD/PI and/or the submitting organization or institution regarding project revisions (e.g., reductions in the scope of work, funding level, period, or method of support) prior to recommending any project for funding.

After the review process has been completed, NIFA sends copies of reviews, *not* including the identity of reviewers, and a summary (if applicable) of the review panel comments to the PD.

Conflicts of interest. NIFA takes extreme care to prevent any actual or perceived conflicts of interest that may influence the review or evaluation (see NIFA Peer Review Process for Competitive Grant Applications).

B. Evaluation Criteria

NIFA will use the following criteria to evaluate this RFA:

A reviewer's written evaluation entails two levels of assessment. First, the reviewer summarizes how well the application addressed each evaluation criterion. After the application has been assessed for strengths and weaknesses of each criterion, the reviewer then evaluates the overall likelihood that the project will have significant outcome and impact. The written reviews are used to begin panel discussions with other reviewers serving on the peer review panel. Through these discussions, peer review panelists come to consensus on the final ranking of the applications. A complete description of NIFA's peer review process can be found on the NIFA Peer Review Process for Competitive Grant Applications page.

Detailed evaluation criteria for each project type, grant type, and centers of excellence are found in the "AFRI Review Criteria" PDF in the attachments list on the AFRI RFA Resources page. We will use the appropriate evaluation criteria to review applications submitted in response to this RFA.

C. Centers of Excellence

In addition to evaluating applicants using the criterion listed in *Part V § B*, NIFA will use the COE standards described in this RFA to evaluate applicants that rank highly meritorious and requested to be considered as a COE. In instances where applicants are found to be equally meritorious with the application of a non-COE applicant, NIFA will prioritize the COE applicant meeting the COE criteria. NIFA will effectively use the COE prioritization as a "tie breaker." Applicants that rank highly meritorious but who did not request consideration as a COE or who are not deemed to have met the COE standards may still receive funding.

Applicants that meet the COE requirements will have the COE designation in their notice of award. Entities recognized as COE will maintain that distinction for the duration of their period of performance or as identified in the terms and conditions of that award.

D. Organizational Management Information

Applicants must submit specific management information relating to an applicant prior to an award and update the information as needed. Applicants may only have to update their information if they had previously provided the information under this or another NIFA program. NIFA provides the requisite forms during the pre-award process. Although an applicant may be eligible for award under this program, there are factors that may exclude an applicant from receiving federal financial and nonfinancial assistance and benefits under this program (e.g., debarment or suspension of an individual, or a determination that an applicant is not responsible).

E. Application Disposition

Applicants may withdraw at any time before NIFA makes a final funding decision. NIFA will retain all applications, including withdrawn applications and unfunded applications.

PART VI. AWARD ADMINISTRATION

A. General

Within the limit of funds authorized, the NIFA awarding official will make grants to responsible and eligible applicants whose applications are judged most meritorious under the procedures set forth in this RFA. The date specified by the NIFA awarding official as the effective date of the grant must be no later than September 30 of the federal fiscal year in which the project is approved for support and funds are appropriated for such purpose, unless otherwise permitted by law. The project need not be initiated on the grant effective date, but as soon thereafter as practical so that project goals may be attained within the funded project period. All funds granted by NIFA under this RFA may be used only for the purpose for which they are granted in accordance with the approved application and budget, regulations, terms and conditions of the award, applicable federal cost principles, USDA assistance regulations, and NIFA General Awards Administration Provisions, 7 CFR Part 3430, subparts A through E.

Award Notice. The award document will provide pertinent instructions and information as described in 2 CFR 200.211 (see NIFA's Terms and Conditions).

B. Administrative and National Policy Requirements

Several federal statutes and regulations apply to grant applications and the projects outlined in this RFA (some are listed here: Federal Regulations). Unless specifically noted by statue or award-specific requirements, NIFA Policy Guide applies to all NIFA awards.

PART VII. OTHER INFORMATION

A. Use of Funds and Changes in Budget

Delegation of fiscal responsibility. Unless the terms and conditions of the award state otherwise, awardees may not in whole or in part delegate or transfer to another person, institution, or organization the responsibility for use or expenditure of award funds.

Changes in Budget or Project Plans. In accordance with 2 CFR 200.308, awardees must request prior approval from NIFA for the following program or budget-related reasons (the awardee is subject to the terms and conditions identified in the award):

1. Change in the scope or the objective of the project or program without prior written approval (even if there is no associated budget revision requiring).
2. Change in a key person specified in the application or the federal award.
3. Disengagement from the project for more than three months, or a 25 percent reduction in time devoted to the project.
4. Inclusion of costs that require prior approval in accordance with 2 CFR 200 Subpart E (Cost Principles), or 45 CFR Part 75 Appendix IX, (Principles for Determining Costs Applicable to Research and Development under Awards and Contracts with Hospitals), or 48 CFR, unless waived by the federal awarding agency,
5. 48 CFR Part 31, Contract Cost Principles and Procedures;
6. Transfer of funds budgeted for participant support costs to other categories of expense (2 CFR 200.456 Participant support costs);
7. Sub-awarding, transferring or contracting out of any work under a federal award, including fixed amount sub-awards (see 2 CFR 200.333, Fixed Amount Sub-awards), unless described in the application and funded in the approved federal awards. This provision does not apply to the acquisition of supplies, material, equipment, or general support services.
8. Changes in the approved cost-sharing or matching provided by the non-federal entity; and
9. The need for additional federal funds to complete the project.

B. Confidential Aspects of Applications and Awards

When an application results in an award, it becomes a part of NIFA transaction records, which are available to the public. Information that the Secretary of Agriculture determines to be confidential, privileged, or proprietary in nature will be held in confidence to the extent permitted by law. Therefore, applicants should clearly mark any information within the application they wish to have considered as confidential, privileged, or proprietary. NIFA will retain a copy of an application that does not result in an award for three years. Such an application will be released only with the consent of the applicant or to the extent required by law. An applicant may withdraw at any time prior to the final action thereon.

C. Regulatory Information

This program is not subject to the provisions of Executive Order 12372, which requires intergovernmental consultation with state and local officials. Under the provisions of the Paperwork Reduction Act of 1995 (44 U.S.C. Chapter 35), the collection of information requirements contained in this notice have been approved under OMB Document No. 0524-0039.

APPENDIX I: AGENCY CONTACT

AFRI Program Office:
Dr. Parag Chitnis, Associate Director, National Institute of Food and Agriculture
Dr. Debora Hamernik, Deputy Director, Institute of Food Production and Sustainability
Dr. Suzanne Stluka, Deputy Director, Institute of Food Safety and Nutrition
Dr. Venugopal Kalavacharla, Deputy Director, Institute of Youth, Family, and Community
Dr. Kevin Kephart, Deputy Director, Institute of Bioenergy, Climate, and Environment
Telephone: (816) 926-1604
E-mail: AFRI@usda.gov

Specific questions pertaining to technical matters may be directed to the appropriate Program Area Priority Contacts:

Program Area Contacts

Program Area	Program Area Contacts
Plant Health and Production and Plant Products	John Erickson (816) 283-6422; john.erickson@usda.gov Victoria Finkenstadt (816) 520-8456; victoria.finkenstadt@usda.gov Erica Kistner-Thomas (816) 894-9283, erica.kistnerthomas@usda.gov Mathieu Ngouajio (202) 570-1915; mathieu.ngouajio@usda.gov ~~Christopher Phillips, christopher.phillips@usda.gov~~ Chris Philips, christopher.philips@usda.gov Vance Owens (816) 283-6925; vance.owens@usda.gov Ann Stapleton (816) 274-1942; ann.stapleton@usda.gov Christian Tobias (610) 312-7619; christian.tobias@usda.gov
Animal Health and Production and Animal Products	Kathe Bjork (816) 591-7415; kathe.e.bjork@usda.gov ~~Andres Cibils (816) 745-0369; andres.cibils@usda.gov~~ Kamilah Grant; kamilah.grant@usda.gov Mark Mirando (202) 445-5575; mark.mirando@usda.gov Frank Siewerdt (816) 329-9745; frank.siewerdt@usda.gov Steven Smith (202) 445-5480; steven.i.smith@usda.gov Tim Sullivan (816) 527-5434; timothy.sullivan@usda.gov Angelica Van Goor (816) 584-5304; angelica.van.goor@usda.gov
Food Safety, Nutrition, and Health	Kathe Bjork (816) 591-7415; kathe.e.bjork@usda.gov J. Mark Carter (816) 820-9533; mark.carter@usda.gov Hongda Chen (202) 445-5582; hongda.chen@usda.gov Lisa Jahns (816) 820-9584; lisa.jahns@usda.gov Lydia Kaume (816) 642-4607; lydia.kaume@usda.gov Mallory Koenings (202) 604-1985; mallory.koenings@usda.gov

Program Area	Program Area Contacts
Bioenergy, Natural Resources, and Environment	Toby Aherns; toby.aherns@usda.gov Daniel Cassidy; patrick.cassidy@usda.gov James Dobrowolski (202) 420-8918; james.dobrowolski@usda.gov Victoria Finkenstadt (816) 520-8456; victoria.finkenstadt@usda.gov Amy Ganguli (816) 642-0813; amy.ganguli@usda.gov Sandeep Kumar (816) 832-7235; sandeep.kumar@usda.gov Adam Wilke (816-398-5277; adam.wilke@usda.gov Diomides Zamora (202) 590-6049; diomides.zamora@usda.gov
Agriculture Systems and Technology	Ganesh Bora (816) 489-0944; ganesh.bora@usda.gov Hongda Chen (202) 445-5582; hongda.chen@usda.gov James Dobrowolski (202) 420-8918; james.dobrowolski@usda.gov Victoria Finkenstadt (816) 520-8456; victoria.finkenstadt@usda.gov Steven Thomson (202) 603-1053; steven.j.thomson@usda.gov
Agriculture Economics and Rural Communities	Ganesh Bora (816) 489-0944; ganesh.bora@usda.gov Denis Ebodaghe (202) 445-5460; denis.ebodaghe@usda.gov Keith Harris (816) 916-0332; keith.harris@usda.gov David Songstad (816) 412-7422; david.songstad@usda.gov Charlotte Tuttle (612) 499-8966; charlotte.tuttle@usda.gov

Program Area	Program Area Contacts
Crosscutting Programs	Bisoondat Macoon (601) 331-6023; bisoondat.macoon@usda.gov Ganesh Bora (816) 489-0944; ganesh.bora@usda.gov Hongda Chen (202) 445-5582; hongda.chen@usda.gov Andres Cibils (816) 745-0369; andres.cibils@usda.gov Michelle Colby (202) 577-8815; michelle.colby@usda.gov James Dobrowolski (202) 420-8918; james.dobrowolski@usda.gov Amer Fayad (816) 894-7228; amer.fayad@usda.gov Amy Ganguli (816) 642-0813; amy.ganguli@usda.gov Rubella Goswami (202) 306-0954; rubella.goswami@usda.gov Kamilah Grant (352) 805-8872; kamilah.grant@usda.gov Keith Harris (816) 916-0332; keith.harris@usda.gov Lydia Kaume (816) 642-4607; lydia.kaume@usda.gov Erica Kistner-Thomas (816) 894-9283, erica.kistnerthomas@usda.gov Mark Mirando (202) 445-5575; commodityboards@usda.gov Ashley Mueller (816) 412-7411; ashley.mueller@usda.gov Vijay Nandula (816) 894-7229; vijay.nandula@usda.gov Maurice Smith (816) 518-1754; maurice.smith2@usda.gov Steven Smith (202) 445-5480; steven.i.smith@usda.gov Ann Stapleton (816) 274-1942; ann.stapleton@usda.gov Tim Sullivan (816) 527-5434; timothy.sullivan@usda.gov Steven Thomson (202) 603-1053; steven.j.thomson@usda.gov Charlotte Tuttle (612) 449-8966; charlotte.tuttle@usda.gov Angelica Van Goor (816) 584-5304; angelica.van.goor@usda.gov Adam Wilke (816) 398-5277; adam.wilke@usda.gov Diomides Zamora (202) 590-6049; diomides.zamora@usda.gov

For administrative questions related to

1. Grants.gov, see *Part IV*
2. Other RFA or application questions, please email grantapplicationquestions@usda.gov
3. Awards under this RFA, please email awards@usda.gov

U.S. Postal Mailing Address:
National Institute of Food and Agriculture
U.S. Department of Agriculture
P.O. Box 419205, MS 10000
Kansas City, MO 64141-6205

Courier/Package Delivery Address:
National Institute of Food and Agriculture
United States Department of Agriculture
2312 East Bannister Road, MS 10000
Kansas City, MO 64141-3061

APPENDIX II: GLOSSARY OF TERMS

Name	Acronyms
Agriculture and Food Research Initiative	AFRI
Authorized Representative	AR
Agricultural Research, Extension, and Education Reform Act of 1998	AREERA
Coordinated Agricultural Project	CAP
Catalog of Federal Domestic Assistance	CFDA
Centers of Excellence	COE
Data Management Plan	DMP
Established Program to Stimulate Competitive Research	EPSCoR
Food and Agricultural Science Enhancement	FASE
Indirect costs	IDC
National Institute of Food and Agriculture	NIFA
Request for Application	RFA
Research, Education, and Economics	REE
United States Department of Agriculture	USDA

APPENDIX III: DEFINITIONS

Refer to 7 CFR 3430 Competitive and Noncompetitive Non-formula Federal Assistance Programs – General Award Administrative Provisions for additional definitions.

Terms	Definitions
Applied Research	Research that includes expansion of the findings of fundamental research to uncover practical ways in which new knowledge can be advanced to benefit individuals and society.
Continuation Award	An award instrument by which NIFA agrees to support a specified level of effort for a predetermined period of time with a statement of intention to provide additional support at a future date, provided that performance has been satisfactory, appropriations are available for this purpose, and continued support would be in the best interest of the federal government and the public.
Education Activity	Education activity or teaching activity means formal classroom instruction, laboratory instruction, and practicum experience in the food and agricultural sciences and other related matters such as faculty development, student recruitment and services, curriculum development, instructional materials and equipment, and innovative teaching methodologies.
Established Program to Stimulate Competitive Research	EPSCoR is a list of eligible states that are eligible for USDA EPSCoR funding which is determined every year by NIFA. This list includes states having a funding level no higher than the 38th percentile of all States based on a 3-year rolling average of AFRI funding levels, excluding FASE Strengthening funds granted to EPSCoR States and small-midsized and minority-serving degree-granting institutions. The current list is included in the "AFRI Grant Types" PDF in the attachments list on the AFRI RFA Resources page.
Extension Activity	Extension activity means an act or process that delivers science-based knowledge and informal educational programs to people, enabling them to make practical decisions.

Terms	Definitions
Food and Agricultural Science Enhancement Grants	FASE Grants mean funding awarded to eligible applicants to strengthen science capabilities of Project Directors, to help institutions develop competitive scientific programs, and to attract new scientists into careers in high-priority areas of National need in agriculture, food, and environmental sciences. FASE awards may apply to any of the three agricultural knowledge components (i.e., research, education, and extension). FASE awards include Pre- and Postdoctoral Fellowships, New Investigator grants, and Strengthening grants.
Limited Institutional Success	Limited institutional success means institutions that are not among the most successful universities and colleges for receiving Federal funds for science and engineering research. A list of successful institutions is provided in the "Table 2 Least Successful Institutions" PDF in the attachments list on the AFRI RFA Resources page.
Matching	The process through which a grant recipient match awarded USDA funds with cash and in-kind contributions on a dollar-for-dollar basis. The matching funds must derive from non-Federal sources.
Minority	Minority means Alaskan Native, American Indian, Asian-American, African-American, Hispanic American, Native Hawaiian, or Pacific Islander. The Secretary will determine on a case-by-case basis whether additional groups qualify under this definition, either at the Secretary of Agriculture's initiative, or in response to a written request with supporting explanation.
Minority-Serving Institution	Minority-Serving Institution means an accredited academic institution whose enrollment of a single minority or a combination of minorities exceeds 50% of the total enrollment, including graduate and undergraduate and full- and part-time students. An institution in this instance is an organization that is independently accredited as determined by reference to the current version of the *Higher Education Directory*, published by Higher Education Publications, Inc., 6400 Arlington Boulevard, Suite 648, Falls Church, Virginia 22042 (703-532-2300).
Multidisciplinary Project	A project on which investigators from two or more disciplines collaborate to address a common problem. These collaborations, where appropriate, may integrate the biological, physical, chemical, or social sciences.
New Application	An application not previously submitted to a program.
Renewal Application	A project application that seeks additional funding for a project beyond the period that was approved in an original or amended award.

Terms	Definitions
Resubmitted Application	A project application that was previously submitted to a program, but the application was not funded.
Resubmitted Renewal Application	A project application that requests additional funding for a project beyond the period that was approved in the original award. This is an application that had previously been submitted for renewal to but not funded.
Small and Mid-Sized Institutions	Academic institutions with a current total enrollment of 17,500 or less including graduate and undergraduate and full- and part-time students. An institution, in this instance, is an organization that possesses a significant degree of autonomy. Significant degree of autonomy is defined by being independently accredited as determined by reference to the current version of the Higher Education Directory, published by Higher Education Publications, Inc., 6400 Arlington Boulevard, Suite 648, Falls Church, Virginia 22042 (703-532-2300).
Strengthening Grants	Funds awarded to institutions eligible for FASE Grants to enhance institutional capacity, with the goal of leading to future funding in the project area, as well as strengthening the competitiveness of the investigator's research, education, and/or extension activities. Strengthening grants consist of Standard, Coordinated Agricultural Project and Conference Grant types as well as Seed Grants, Equipment Grants, and Sabbatical Grants.
Transdisciplinary Team	A team composed of investigators from multiple disciplines that cross boundaries using holistic approaches to address complex challenges that cannot be solved using single-disciplinary approaches.
USDA Established Program to Stimulate Competitive Research States	EPSCoR States mean States which have been less successful in receiving funding from AFRI, having a funding level no higher than the 38th percentile of all States based on a 3-year average of AFRI funding levels, excluding FASE Strengthening funds granted to state agricultural experiment stations and degree-granting institutions in EPSCoR States and small, mid-sized, and minority-serving degree-granting institutions. The most recent list of USDA EPSCoR States is provided in the "AFRI Grant Types" PDF in the attachments list on the AFRI RFA Resources page.

APPENDIX IV: OTHER AFRI RESOURCES

AFRI program information is available on the NIFA AFRI website. The following are among the materials available:

1. Stakeholder Input
2. Requests for Applications
3. AFRI Abstracts of Funded Projects Listed by State
4. AFRI Annual Review
5. Frequently Asked Questions
6. Interagency Programs
7. AFRI RFA Resources
   a. ***Most Successful Universities and Colleges.*** Any institution listed on this list, Most Successful Universities and Colleges Receiving Federals Funds, is not eligible for Strengthening Grants from the FASE program unless they are located in an EPSCoR state. See "Table 1 Most Successful Institutions" in the attachments list.
   b. ***Lowest One Third of Universities and Colleges Receiving Federal Funds.*** The lowest one third of universities and colleges receiving Federal funds is used to determine eligibility for possible waiver of matching funds requirement for Equipment Grants (see "Table 2 Least Successful Institutions" in the attachments list).
   c. ***Flow Chart for Strengthening Grant Eligibility.*** The Flow Chart for Strengthening Grant Eligibility will help to determine your eligibility to apply for strengthening grants (see "FASE Strengthening Grant Eligibility Flow Chart" in the attachments list).
8. AFRI Deadlines