

2017 South Dakota State University Combined Research and Extension Plan of Work

Status: Accepted

Date Accepted: 06/07/2016

I. Plan Overview

1. Brief Summary about Plan Of Work

The College of Agriculture & Biological Sciences at South Dakota State University is home to both SDSU Extension and the South Dakota Agricultural Experiment Station. The college is the largest at SDSU in terms of student enrollment, faculty/staff, and building space. Our college and SDSU's College of Education and Human Sciences work closely together to provide important programs in food science and research. Through many important partnerships, we are able to expand the boundaries of knowledge and enhance society.

SDSU Extension and the South Dakota Agricultural Experiment Station achieve their goals with researchers and state specialists located on the SDSU campus in Eastern South Dakota, eight regional centers operating across the state with field specialists, and six research field stations. Outreach is also achieved with three Federally Recognized Tribal Extension Program offices, and the West River Agricultural Center representing the Western part of South Dakota. 4-H Youth Development begins on campus with the South Dakota State 4-H Office and has 4-H field specialists in the regional centers and 4-H youth advisors in county owned offices. Additionally, iGrow is SDSU Extension's teaching platform to deliver valuable information to the online community.

South Dakota State University uses the following Planned Programs in its Combined Research and Extension Plan of Work. The Planned Programs are based on the USDA Knowledge Area Classification System.

Natural Resources and Environment

The research activities in this program are primarily supported by our Department of Natural Resource Management. Hatch funded projects include but are not limited to research studies in changes in soil carbon, land conversion, environmental impacts on grasslands, climate variability, the impact on crops from Canada geese, watershed management, soil productivity, bioenergy, wildlife habitat, pollution prevention, and range management. Activities for SDSU Extension in this Planned Program involve grassland management, wildlife habitat development, no-till, corn and soybean nitrogen recommendations, soils management, and Concentrated Animal Feeding Operations.

Plants and Their Systems

The research activities in this program are primarily supported by our Department of Plant Science and our Department of Biology and Microbiology. Hatch funded projects include but are not limited to research studies in nitrogen fixation, oat breeding, oilseed production, nodule development in soybeans, wheat genetics and genomics, perennial grasses for bioenergy, crop pests and diseases, grapevine mapping, and improved alfalfa production. Activities for SDSU Extension in this Planned Program involve nitrate quick tests for forages, alfalfa growth and production testing, Pesticide Applicator Training, Master Gardeners, and Integrated Pest Management.

Animals and Their Systems

The research activities in this program are primarily supported by our Department of Animal Science, Department of Dairy Science and our Veterinary and Biomedical Sciences. Hatch funded projects include but are not limited to research studies in feeding strategies for gestating gilts and sows, pre-harvest management of beef cattle, co-product feeds for sheep, milk production management for dairy cattle, vaccines for viral diseases, and reproductive efficiency in cattle. Activities for SDSU Extension in this Planned Program involve dairy management practices, beginning beef producers, beginning sheep producers, animal welfare, and the Calf Value Discovery program.

Agricultural, Natural Resource, and Biological Engineering

The research activities in this program are primarily supported by our Department of Agricultural and Biosystems Engineering. Hatch funded projects include bio-renewable graphene production, lignocellulosic based bio fuel, and the development of microorganisms to facilitate composting of plant materials. Activities for SDSU Extension in this Planned Program include Subsurface Drainage Design and Water Management.

Food and Non-Food Products: Development, Processing, Quality, and Delivery

The research activities in this program are primarily supported by our Department of Agricultural and Biosystems Engineering, Department of Dairy Science, and our Department of Biology and Microbiology. Hatch funded projects include but are not limited to third generation fuels from biomass or carbon dioxide, medicinal uses of native plants, the conversion of lignocellulosic biomass into advanced liquid biofuels, the manufacture of new dairy food products, technologies for improving food safety, and the development of oilseed biofuels. Activities for SDSU Extension in this Planned Program include Barbeque Bootcamp.

Economics, Markets, and Policy

The research activities in this program are supported by our Department of Economics. Hatch funded projects include but are not limited to economic impacts of agricultural and trade policy issues, enhancing rural sustainability and quality of life, agricultural commodity prices, agricultural land market trends, enhancing the value of U.S. beef, and the economic impacts on wildlife and crop production from biofuel production. Activities for SDSU Extension in this Planned Program involve risk and business management, commodity marketing, costs of crop production, and the Ag CEO program.

Human Nutrition, Food Safety, and Human Health and Well-Being

The research activities in this program are supported by our partnership with the College of Education and Human Sciences. Hatch funded projects include research involving dietary bioactive food components, rural food environment, intervention to improve healthful behaviors in young adults, and dietary influences on obesity and chronic inflammation. Activities for SDSU Extension involve gerontology, healthy eating and physical activity, worksite wellness, food processing and food marketing, chronic diseases, community and school gardens, and gardening and farmers markets for refugees.

Families, Youth, and Communities

The research activities in this program are supported by our partnership with College of Education and Human Sciences. The Hatch funded project is research that involves psychological and behavioral factors that impact the decision to save financially. Activities for SDSU Extension involve 4-H Youth Development, women in agriculture, estate and transition planning, family financial wellness, Native American events, rural sustainability, and building community capacity.

Estimated Number of Professional FTEs/SYs total in the State.

Year	Extension		Research	
	1862	1890	1862	1890
2017	108.0	0.0	167.0	0.0
2018	108.0	0.0	167.0	0.0
2019	108.0	0.0	167.0	0.0
2020	108.0	0.0	167.0	0.0
2021	108.0	0.0	167.0	0.0

II. Merit Review Process

1. The Merit Review Process that will be Employed during the 5-Year POW Cycle

- Internal University Panel
- External Non-University Panel
- Expert Peer Review

2. Brief Explanation

The department head and the AES Director serve as merit reviewers. Reviewers evaluate why the proposed research is needed, it's relevance to agriculture, the target audience, and how it compliments other research. Proposals for research grants that are funded by stakeholder groups are subjected to review by the stakeholders themselves and by college administrators. SDSU Extension administrators serve as the merit review team for the plan of work. Department heads and program directors conduct peer reviews of programs.

III. Evaluation of Multis & Joint Activities

1. How will the planned programs address the critical issues of strategic importance, including those identified by the stakeholders?

The Planned Programs are based on input from traditional and non-traditional stakeholder groups who identified critical issues. For the purposes of program planning, South Dakota also considers the input of internal stakeholders, which includes Extension state specialists, field specialists, and scientists. The resulting Planned Programs address critical needs and opportunities through integrated research and educational programs.

2. How will the planned programs address the needs of under-served and under-represented populations of the State(s)?

Great efforts are made to seek out and include under-served and under-represented populations in the initial planning of research and Extension programs. In some cases, this

involves direct contact with under-served and/or under-represented audiences. In other cases, mass media announcements are used to invite all South Dakotans to participate in program planning.

SDSU Extension has added emphasis in Native American programming through several of its signature programs, particularly with the Healthy Foods, Healthy Communities program. As noted in the Stakeholder Input section, Native American is one of the capstone areas that is part of SDSU Extension. The input from constituents greatly increases our understanding of challenges facing the Native American communities in South Dakota.

Outreach to our immigrant populations is also important to SDSU Extension. Much of the immigrant population in South Dakota is Hispanic or Latino and is involved in the dairy industry. The demand for alternate languages is moderate but limited, and SDSU Extension provides print and online materials in Spanish as needed.

3. How will the planned programs describe the expected outcomes and impacts?

The Planned Programs address specific outcomes that occur over the 5-year period of this plan. Some Planned Programs may deliver initial outcomes and impacts in the first year, but the overall impact of these programs will be felt beyond the 5-year planning cycle. Each of the South Dakota Planned Programs list specific outcomes that document progress.

4. How will the planned programs result in improved program effectiveness and/or

South Dakota State University has a strong history of actively integrating research, teaching and Extension programs to deliver science-based information to all citizens. Stakeholder input, from SDSU Extension five-year assessment planning data and other sources, is also used by scientists and classroom educators to gain a better understanding of current needs. Joint FTE appointments give individuals the opportunity to work in a combination of research, Extension and teaching functions, allowing the further integration and transfer of information within the system.

IV. Stakeholder Input

1. Actions taken to seek stakeholder input that encourages their participation

- Use of media to announce public meetings and listening sessions
- Targeted invitation to traditional stakeholder groups
- Targeted invitation to non-traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Targeted invitation to non-traditional stakeholder individuals
- Targeted invitation to selected individuals from general public
- Survey of traditional stakeholder groups
- Survey of traditional stakeholder individuals
- Survey specifically with non-traditional groups
- Survey specifically with non-traditional individuals

Brief explanation.

Stakeholder participation is solicited from many sources and events, including agricultural check-off groups, commodity groups, funding organizations, governmental agencies, elected officials and boards, public events and meetings, news releases, and industry associations. SDSU Extension seeks and receives stakeholder participation through focused conversations with representative constituent groups reflective of outreach conducted via our Capstone Program Areas. The capstone groups are:

- Competitive Livestock Systems
- Competitive Cropping Systems
- Urban/Rural Interface
- Food & Families
- 4-H Youth Development
- Community Development
- Native American

Stakeholders are highly encouraged to participate in and take an active interest in SDSU Extension by providing direction, suggestions, and positive ideas. We ask stakeholders to share visionary strategies that meet the SDSU Extension mission, particularly in the capstone area they are representing. Stakeholders are encouraged to provide feedback and ideas for collaboration and partnership, and to help SDSU Extension reach and serve all demographic populations of the state. At the county level, County Commissioners are asked to maintain a county advisory structure that engages the local 4-H Promotion and Expansion Committee in the advisory role. This advisory structure predominantly gives guidance to county funded budgets and local 4-H expansion efforts.

Other Example Sources of Stakeholder Input:

- South Dakota Soybean Research and Promotion Council
- South Dakota Beef Industry Council
- South Dakota Corn Utilization Council
- South Dakota Oilseeds Council
- South Dakota Pork Producers Council
- South Dakota Wheat Commission Council
- South Dakota Department of Education and Cultural Affairs
- South Dakota Department of Health
- South Dakota Department of Social Services
- South Dakota Department of Economic Development
- Department of Energy
- Environmental Protection Agency
- South Dakota Department of Agriculture
- Office of State Veterinarian
- South Dakota Game, Fish and Parks
- Natural Resources Conservation Service
- Bureau of Indian Affairs
- South Dakota Weed and Pest Commission
- South Dakota 4-H Leaders Association
- South Dakota Association of County Commissioners

2(A). A brief statement of the process that will be used by the recipient institution to identify individuals and groups stakeholders and to collect input from them

1. Method to identify individuals and groups

- Use Advisory Committees
- Open Listening Sessions
- Needs Assessments
- Use Surveys

Brief explanation.

Individuals and groups are identified through networking, attending conferences, public meetings, the internet, programming efforts, field tours, emails, and face-to-face arrangements.

2(B). A brief statement of the process that will be used by the recipient institution to identify individuals and groups who are stakeholders and to collect input from them

1. Methods for collecting Stakeholder Input

- Meeting with traditional Stakeholder groups
- Survey of traditional Stakeholder groups
- Meeting with the general public (open meeting advertised to all)
- Meeting specifically with non-traditional groups
- Survey specifically with non-traditional groups

Brief explanation.

Open dialogues are held with constituent groups to identify ways in which SDSU Extension can provide/develop outreach programs to meet identified needs to the targeted audience, whether that is a broad scale audience (ie. ag producers) or specific sub-audiences (beef producers). Capstone program areas will engage with their constituent groups on a quarterly to semi-annual basis. Written summaries of this feedback are produced and then shared on our web portal so they are accessible to staff and the general public. This feedback is then used to guide strategic program development within that program area.

3. A statement of how the input will be considered

- In the Budget Process
- To Identify Emerging Issues
- Redirect Extension Programs
- Redirect Research Programs
- In the Staff Hiring Process
- In the Action Plans
- To Set Priorities

Brief explanation.

Administrators evaluate all input, requests and comments from stakeholders. SDSU Extension writes summaries of the discussions held by each capstone program group. Program Directors share the summaries specific to the capstone program area with department heads, faculty and specialists during program planning meetings. Stakeholder input is reviewed, considered and used as a basis to create SDSU Extension programs and AES research projects. Of note, the Southeast South Dakota Experiment Farm held its Annual Meeting of the Farm Board and conducted their planning review.

Stakeholder input is very important to the Agricultural Experiment Station and to SDSU Extension. By soliciting input, we learn what the challenges are that they are facing and what they would like to see us do to address their challenges. We also learn what they believe the future of South Dakota looks like, what they see as opportunities, and what they think we can do to support those opportunities.

V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	Natural Resources and Environment
2	Plants and Their Systems
3	Animals and Their Systems
4	Agricultural, Natural Resource, and Biological Engineering
5	Food and Non-Food Products: Development, Processing, Quality, and Delivery
6	Economics, Markets, and Policy
7	Human Nutrition, Food Safety, and Human Health and Well-Being
8	Families, Youth and Communities

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Natural Resources and Environment

2. Brief summary about Planned Program

Natural Resources and Environment

The research activities in this program are primarily supported by our Department of Natural Resource Management. Hatch funded projects include but are not limited to research studies in changes in soil carbon, land conversion, environmental impacts on grasslands, climate variability, the impact on crops from Canada geese, watershed management, soil productivity, bioenergy, wildlife habitat, pollution prevention, and range management. Activities for SDSU Extension in this Planned Program involve grassland management, wildlife habitat development, no-till, corn and soybean nitrogen recommendations, soils management, and Concentrated Animal Feeding Operations.

3. Program existence : Intermediate (One to five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
101	Appraisal of Soil Resources	10%		11%	
102	Soil, Plant, Water, Nutrient Relationships	43%		14%	
103	Management of Saline and Sodic Soils and Salinity	0%		1%	
111	Conservation and Efficient Use of Water	3%		3%	
112	Watershed Protection and Management	0%		13%	
121	Management of Range Resources	30%		14%	
131	Alternative Uses of Land	4%		1%	
133	Pollution Prevention and Mitigation	10%		4%	
134	Outdoor Recreation	0%		1%	
135	Aquatic and Terrestrial Wildlife	0%		25%	
136	Conservation of Biological Diversity	0%		11%	
141	Air Resource Protection and Management	0%		2%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

South Dakota has a wide diversity of natural resources that depend on maintenance and good stewardship of the land. Too much grazing, urban sprawl, the creation of reservoirs, plant invasion, feedlot runoff, global warming, as well as the growing world economy all contribute to the degradation of our natural resources. The mismanagement of natural resources can cause many problems that affect the sustainability of grasslands. Without proper maintenance of this resource, the livelihood of ranchers is at risk.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research
- Multistate Extension
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

We Assume:

- There is an economic benefit to preserving our natural resources
- Global warming is linked to increased levels of carbon dioxide in the atmosphere
- The Conservation Reserve Program provides habitat for wildlife populations
- Bacteria play a crucial role in soil fertility
- Climate changes impact agriculture
- Agricultural production can contaminate soil, air, and water resources
- Perennial grasses are prime candidates for cellulosic ethanol production
- Vegetative treatment systems are designed to prevent feedlot runoff
- Invasive plant species alter ecosystem processes
- Proper grassland management increases the sustainability of grasslands

2. Ultimate goal(s) of this Program

Goals:

- Protect and provide habitat for wildlife and sport fisheries
- Maintain or increase the soil organic carbon levels
- Contribute to the understanding of soil fertility
- Provide revised nutrient recommendations for corn and wheat
- Enable producers to make better environmental choices
- Protect water quality
- Increase renewable energy
- Reduce soil degradation
- Improve profitability for farmers growing bioenergy feed stocks
- Provide outreach for the management of pesticides and contaminants

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	6.5	0.0	36.7	0.0
2018	6.5	0.0	36.7	0.0
2019	6.5	0.0	36.7	0.0
2020	6.5	0.0	36.7	0.0
2021	6.5	0.0	36.7	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

- Conduct Field and Lab Research
- Collaborate with Other States
- Partner with South Dakota Game, Fish and Parks
- Partner with the South Dakota Grassland Coalition
- Partner with Business Organizations
- Collaborate with Non-profit Organizations
- Participate with the South Dakota State Climate Office
- Conduct Training for Concentrated Animal Feeding Operations
- Partner with the South Dakota Department of Environment and Natural Resources
- Partner with the Natural Resources Conservation Service

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
<ul style="list-style-type: none"> • Education Class • Workshop • Demonstrations 	<ul style="list-style-type: none"> • Newsletters • Web sites other than eXtension • Other 1 (social media)

3. Description of targeted audience

- Watershed Practioners
- Wildlife and Fisheries Managers
- Scientists
- Environmentalists
- Outdoor Enthusiasts
- Farmers, Ranchers and Producers
- General Public
- Operators of Concentrated Animal Feeding Operations

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
 - Direct Adult Contacts
 - Indirect Adult Contacts
 - Direct Youth Contacts
 - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Percentage of all Hatch Research Projects in Natural Resources and Environment
- Increase Rancher's Knowledge of Grazing Techniques and Grassland Management
- Number of CAFOs Participants
- Number of Publications Posted on iGrow Website
- Number of Articles Posted on iGrow Website
- Number of Podcasts Posted on iGrow Website
- Number of Radio Programs Posted on iGrow Website
- Create Soil Health Learning Opportunities
- Conduct Field Research to Determine the Effectiveness of the Canada Goose Damage Program
- Research Climate Variability and Management Impacts on South Dakota Grasslands
- Research Environmental Impacts on South Dakota Grasslands

- Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Number of Natural Resources and Environment Hatch Research Projects
2	Number of Grazing School Participants
3	Number of CAFOs Training Sessions
4	Increase Soil Management Knowledge to Participants
5	Increase Knowledge to Control the Canada Goose Population
6	Produce Knowledge to Implement a State-and-Transition Model for South Dakota Grasslands

Outcome # 1

1. Outcome Target

Number of Natural Resources and Environment Hatch Research Projects

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 103 - Management of Saline and Sodic Soils and Salinity
- 102 - Soil, Plant, Water, Nutrient Relationships
- 112 - Watershed Protection and Management
- 133 - Pollution Prevention and Mitigation
- 136 - Conservation of Biological Diversity
- 101 - Appraisal of Soil Resources
- 135 - Aquatic and Terrestrial Wildlife
- 111 - Conservation and Efficient Use of Water
- 141 - Air Resource Protection and Management
- 121 - Management of Range Resources
- 134 - Outdoor Recreation
- 131 - Alternative Uses of Land

4. Associated Institute Type(s)

- 1862 Research

Outcome # 2

1. Outcome Target

Number of Grazing School Participants

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 102 - Soil, Plant, Water, Nutrient Relationships
- 101 - Appraisal of Soil Resources
- 121 - Management of Range Resources

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 3

1. Outcome Target

Number of CAFOs Training Sessions

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 133 - Pollution Prevention and Mitigation

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 4

1. Outcome Target

Increase Soil Management Knowledge to Participants

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 102 - Soil, Plant, Water, Nutrient Relationships

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 5

1. Outcome Target

Increase Knowledge to Control the Canada Goose Population

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 135 - Aquatic and Terrestrial Wildlife

4. Associated Institute Type(s)

- 1862 Research

Outcome # 6

1. Outcome Target

Produce Knowledge to Implement a State-and-Transition Model for South Dakota Grasslands

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 121 - Management of Range Resources

4. Associated Institute Type(s)

- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Description

Climate variability in South Dakota can be extreme. Drought and blizzards are very common, which can cause programming and resources to be redirected.

With the dairy industry expanding in South Dakota, the Hispanic workforce continues to grow. There is also a small growth of Karen in parts of the state that could continue to expand.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

SDSU Extension will continue to conduct post-workshop surveys as stated in the Evaluation Results section of the Annual Report.

State Defined Outcome # 4
Post-workshop Survey:

Concentrated Animal Feeding Operations Training Program

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Plants and Their Systems

2. Brief summary about Planned Program

Plants and Their Systems

The research activities in this program are primarily supported by our Department of Plant Science and our Department of Biology and Microbiology. Hatch funded projects include but are not limited to research studies in nitrogen fixation, oat breeding, oilseed production, nodule development in soybeans, wheat genetics and genomics, perennial grasses for bioenergy, crop pests and diseases, grapevine mapping, and improved alfalfa production. Activities for SDSU Extension in this Planned Program involve nitrate quick tests for forages, alfalfa growth and production testing, Pesticide Applicator Training, Master Gardeners, and Integrated Pest Management.

3. Program existence : Intermediate (One to five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		31%	
202	Plant Genetic Resources	0%		6%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		18%	
204	Plant Product Quality and Utility (Preharvest)	4%		3%	
205	Plant Management Systems	12%		6%	
206	Basic Plant Biology	13%		6%	
211	Insects, Mites, and Other Arthropods Affecting Plants	24%		5%	
212	Diseases and Nematodes Affecting Plants	9%		12%	
213	Weeds Affecting Plants	8%		1%	
214	Vertebrates, Mollusks, and Other Pests Affecting Plants	0%		2%	
215	Biological Control of Pests Affecting Plants	0%		3%	
216	Integrated Pest Management Systems	30%		7%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

On-going research is needed to improve plant varieties, increase agricultural productivity, and better understand plant diseases. Drought, changing climatic conditions, soil erosion, crop diseases, insect pests, and fewer acres of land available for farming are all serious production constraints for all crops produced in South Dakota.

Community, school, and home gardening continues to expand. Master Gardeners act as an arm of Extension, volunteering thousands of hours in communities across South Dakota. Master Gardener training is necessary to keep the program viable.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research

- Multistate Extension
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

We Assume:

- Plants face biological challenges when confronted by environmental stresses
- Genetically adapted cultivars are needed to provide bioenergy production
- New and re-emerging disease problems may become economically damaging
- There is a potential of new or underutilized oilseed crops
- Plant viruses cause yield and quality losses in agricultural commodities
- Grain production must increase at an annual rate of 2% to meet human needs by 2050
- Cover crops provide for improved soil quality and sustainable crop production
- Producers will use pesticides
- The desire for home gardening will continue to increase

2. Ultimate goal(s) of this Program

Goals:

- New and Improved plant varieties
- Increased agriculture production
- Eradicate plant diseases
- Develop drought resistant wheat
- Reduce economic impacts of fungal diseases on corn and soybeans
- Increase yield potential of spring wheat cultivars
- Provide advice to growers for maximizing seed yield, oil content, and crop quality
- Complete the analysis and mapping of genes for resistance to the soybean aphid
- Improve the sustainability of wheat production for food and biofuels
- Increase the production of locally grown fruits and vegetables
- Provide safe practices for pesticide application

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	10.8	0.0	46.8	0.0
2018	10.8	0.0	46.8	0.0
2019	10.8	0.0	46.8	0.0
2020	10.8	0.0	46.8	0.0
2021	10.8	0.0	46.8	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

- Develop Improved Oat Cultivars
- Collaborate with Master Gardeners
- Develop Improved Wheat Cultivars
- Conduct Research on Economic Impacts of Fungal Diseases
- Develop Superior Sunflower Germplasm
- Develop New Cultivars of Prairie Cordgrass for Bioenergy Production
- Analyze and Map Genes for Soybean Resistance of Aphids
- Conduct Pesticide Applicator Training Sessions
- Deliver Integrated Pest Management Resources
- Partner with the South Dakota Agri-Business Association

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
<ul style="list-style-type: none"> • Education Class • Workshop • One-on-One Intervention • Demonstrations 	<ul style="list-style-type: none"> • Newsletters • Web sites other than eXtension

3. Description of targeted audience

- Oilseed and Other Specialty Crop Growers
- Research Community
- Soybean Growers
- Wheat Growers
- Corn Growers
- Biofuels Crop Industry
- Producers
- Graduate Students
- Private and Commercial Pesticide Applicators

V(G). Planned Program (Outputs)

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- Number of contacts
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 - Direct Youth Contacts
 - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Percentage of all Hatch Research Projects in Plants and Their Systems
- Number of Pesticide Applicator Training Sessions
- Number of Master Gardener Training Sessions
- Number of Publications Posted on iGrow Website
- Number of Articles Posted on iGrow Website
- Number of Podcasts Posted on iGrow Website
- Number of Radio Programs Posted on iGrow Website
- Conduct Research for Improved Oilseed Production
- Number of Integrated Pest Management Training Events Conducted
- Conduct Research on Spring Wheat Cultivars
- Conduct Research on Oat Cultivars

- Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Number of Plants and Their Systems Hatch Research Projects
2	Number of Pesticide Applicator Training Participants
3	Number of Participants Completing Master Gardener Training
4	Number of Integrated Pest Management Participants
5	Increase Oilseed Crop Knowledge and Productivity and Profitability
6	Release Spring Wheat Cultivars

Outcome # 1

1. Outcome Target

Number of Plants and Their Systems Hatch Research Projects

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 215 - Biological Control of Pests Affecting Plants
- 202 - Plant Genetic Resources
- 204 - Plant Product Quality and Utility (Preharvest)
- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 216 - Integrated Pest Management Systems
- 213 - Weeds Affecting Plants
- 206 - Basic Plant Biology
- 212 - Diseases and Nematodes Affecting Plants
- 205 - Plant Management Systems
- 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants
- 211 - Insects, Mites, and Other Arthropods Affecting Plants

4. Associated Institute Type(s)

- 1862 Research

Outcome # 2

1. Outcome Target

Number of Pesticide Applicator Training Participants

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 211 - Insects, Mites, and Other Arthropods Affecting Plants

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 3

1. Outcome Target

Number of Participants Completing Master Gardener Training

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 205 - Plant Management Systems

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 4

1. Outcome Target

Number of Integrated Pest Management Participants

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 216 - Integrated Pest Management Systems

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 5

1. Outcome Target

Increase Oilseed Crop Knowledge and Productivity and Profitability

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 205 - Plant Management Systems
- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 212 - Diseases and Nematodes Affecting Plants
- 213 - Weeds Affecting Plants
- 204 - Plant Product Quality and Utility (Preharvest)

- 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 6

1. Outcome Target

Release Spring Wheat Cultivars

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 212 - Diseases and Nematodes Affecting Plants
- 202 - Plant Genetic Resources

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Description

Climate variability in South Dakota can be extreme. Drought and blizzards are very common, which can cause programming and resources to be redirected.

With the dairy industry expanding in South Dakota, the Hispanic workforce continues to grow. There is also a small growth of Karen in parts of the state that could continue to expand.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

SDSU Research will continue to conduct data comparisons as stated in the Evaluation Results section of the Annual Report.

State Defined Outcome #7

Data Comparison:

Boost and Surpass Wheat Cultivars

State Defined Outcome # 9

Data Comparison:

Hayden Oat Cultivar

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Animals and Their Systems

2. Brief summary about Planned Program

Animals and Their Systems

The research activities in this program are primarily supported by our Department of Animal Science, Department of Dairy Science and our Veterinary and Biomedical Sciences. Hatch funded projects include but are not limited to research studies in feeding strategies for gestating gilts and sows, pre-harvest management of beef cattle, co-product feeds for sheep, milk production management for dairy cattle, vaccines for viral diseases, and reproductive efficiency in cattle. Activities for SDSU Extension in this Planned Program involve dairy management practices, beginning beef producers, beginning sheep producers, animal welfare, and the Calf Value Discovery program.

3. Program existence : Intermediate (One to five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
301	Reproductive Performance of Animals	14%		11%	
302	Nutrient Utilization in Animals	9%		26%	
303	Genetic Improvement of Animals	0%		5%	
304	Animal Genome	2%		1%	
305	Animal Physiological Processes	0%		4%	
306	Environmental Stress in Animals	4%		0%	
307	Animal Management Systems	46%		10%	
308	Improved Animal Products (Before Harvest)	7%		4%	
311	Animal Diseases	4%		34%	
313	Internal Parasites in Animals	0%		4%	
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals	1%		0%	
315	Animal Welfare/Well-Being and Protection	13%		1%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)**1. Situation and priorities**

Production costs are the determining factor in livestock producer profitability. High feed costs, poor reproductive performance, and disease are primary concerns for producers and scientists.

Sheep and lamb inventory in the United States has been declining over the last few decades. Producers need to grow their flocks to meet the demands of lamb meat and wool, and at the same time keep their operations sustainable.

The success of a cow-calf operation can come down to the marketing strategy employed by the producer. Retained ownership is a program that allows producers the opportunity to start with as few as five of their own calves and pool them with other calves to see how they perform in a feedlot. Retained ownership can provide the greatest opportunity to realize the true value of cattle, but it can also have increased economic risks.

2. Scope of the Program

- In-State Extension

- In-State Research
- Multistate Research
- Multistate Extension
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

We Assume:

- Dairy producers face challenges of fluctuating feed cost and milk prices
- Biofuel industry co-products can be used by the livestock industry
- The administration of estrogen will increase reproductive efficiency in swine
- Volatile cattle prices and environmental issues limit producer sustainability
- There is an economic advantage to having calves born early in the calving season
- Infectious diseases present economic and animal welfare concerns to the swine industry
- Lamb inventory in the United States has been declining for several decades

2. Ultimate goal(s) of this Program

Goals:

- Improve efficiency to produce milk
- Increase reproductive performance in swine
- Reduce costs and increase profits for cattle ranchers
- Increase pregnancy rates in cows
- Improve the quality, speed and affordability of diagnosing viral diseases in swine
- Increase the production of lamb meat and wool

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	16.2	0.0	40.1	0.0
2018	16.2	0.0	40.1	0.0
2019	16.2	0.0	40.1	0.0
2020	16.2	0.0	40.1	0.0
2021	16.2	0.0	40.1	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

- Collaborate with USDA Farm Service to Conduct Farm Bill Training
- Multistate partnership consortium for dairy producers
- Develop Vaccine Technologies
- Research Methodologies to Increase Reproductive Performance in Animals
- Conduct Research that Leads to Muscle Growth Augmentation
- Determine the Effects of Co-product Based Lamb Finishing Diets
- Increase Sheep Production Knowledge
- Coordinate Value-Based Marketing System for Cow-calf Operations
- Increase Beef Production Knowledge
- Conduct Ranch Visits

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
<ul style="list-style-type: none"> • Education Class • Workshop • Group Discussion • One-on-One Intervention • Demonstrations 	<ul style="list-style-type: none"> • Newsletters • Web sites other than eXtension

3. Description of targeted audience

- Veterinarians
- Dairy Producers
- Producers of Ethanol Co-products
- Cattle Producers
- Swine Producers
- Muscle Biologists
- Livestock Nutritionists
- Sheep Industry
- Cow-calf Producers

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
 - Direct Adult Contacts
 - Indirect Adult Contacts
 - Direct Youth Contacts
 - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Percentage of all Hatch Research Projects in Animals and Their Systems
- Publish and Disseminate Results of Nutritional Studies in Sheep Diets
- Number of Learning Activities for Sheep Producers or Consumers
- Demonstrate Value-Based Marketing to Cow-calf Producers
- Create Learning Opportunities in the Beef Industry
- Number of Publications Posted on iGrow Website
- Number of Articles Posted on iGrow Website
- Number of Podcasts Posted on iGrow Website
- Number of Radio Programs Posted on iGrow Website
- Educate Producers with Information Impacting the Dairy Industry
- Develop Approaches for Detection, Prevention and Control of Viral Diseases of Swine

- Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Number of Animals and Their Systems Hatch Research Projects
2	Enable Further Research to Explore Diet Formulation Strategies for Feeding Ruminant Livestock
3	Number of Individuals Participating in Sheep Production Learning Activities
4	Number of Cow-calf Operations Participating in the Calf Value Discovery Program
5	Number of Individuals Participating in Beef Production Learning Activities
6	Sustain and Enhance Growth in Dairy Production
7	Reduce the Impact of Porcine Reproductive and Respiratory Syndrome Virus on Swine Producers

Outcome # 1

1. Outcome Target

Number of Animals and Their Systems Hatch Research Projects

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 304 - Animal Genome
- 301 - Reproductive Performance of Animals
- 305 - Animal Physiological Processes
- 302 - Nutrient Utilization in Animals
- 308 - Improved Animal Products (Before Harvest)
- 307 - Animal Management Systems
- 313 - Internal Parasites in Animals
- 306 - Environmental Stress in Animals
- 315 - Animal Welfare/Well-Being and Protection
- 311 - Animal Diseases
- 303 - Genetic Improvement of Animals

4. Associated Institute Type(s)

- 1862 Research

Outcome # 2

1. Outcome Target

Enable Further Research to Explore Diet Formulation Strategies for Feeding Ruminant Livestock

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 307 - Animal Management Systems

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 3

1. Outcome Target

Number of Individuals Participating in Sheep Production Learning Activities

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 315 - Animal Welfare/Well-Being and Protection
- 308 - Improved Animal Products (Before Harvest)
- 307 - Animal Management Systems

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 4

1. Outcome Target

Number of Cow-calf Operations Participating in the Calf Value Discovery Program

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 315 - Animal Welfare/Well-Being and Protection
- 307 - Animal Management Systems

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 5

1. Outcome Target

Number of Individuals Participating in Beef Production Learning Activities

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 315 - Animal Welfare/Well-Being and Protection
- 307 - Animal Management Systems

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 6

1. Outcome Target

Sustain and Enhance Growth in Dairy Production

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 315 - Animal Welfare/Well-Being and Protection
- 307 - Animal Management Systems
- 302 - Nutrient Utilization in Animals

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 7

1. Outcome Target

Reduce the Impact of Porcine Reproductive and Respiratory Syndrome Virus on Swine Producers

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 311 - Animal Diseases

4. Associated Institute Type(s)

- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Competing Public priorities

- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Description

Climate variability in South Dakota can be extreme. Drought and blizzards are very common, which can cause programming and resources to be redirected.

With the dairy industry expanding in South Dakota, the Hispanic workforce continues to grow. There is also a small growth of Karen in parts of the state that could continue to expand.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

SDSU Extension will continue to conduct data comparisons and surveys as stated in the Evaluation Results section of the Annual Report.

State Defined Outcome #4
Data Comparison:
Calf Value Discovery Program

State Defined Outcome # 6
Data Comparison:
South Dakota Dairies

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Agricultural, Natural Resource, and Biological Engineering

2. Brief summary about Planned Program

Agricultural, Natural Resource, and Biological Engineering

The research activities in this program are primarily supported by our Department of Agricultural and Biosystems Engineering. Hatch funded projects include bio-renewable graphene production, lignocellulosic based bio fuel, and the development of microorganisms to facilitate composting of plant materials. Activities for SDSU Extension in this Planned Program include Subsurface Drainage Design and Water Management.

3. Program existence : Intermediate (One to five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
401	Structures, Facilities, and General Purpose Farm Supplies	0%		10%	
402	Engineering Systems and Equipment	0%		10%	
403	Waste Disposal, Recycling, and Reuse	0%		66%	
404	Instrumentation and Control Systems	0%		14%	
405	Drainage and Irrigation Systems and Facilities	100%		0%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

More research on graphene from Biochar has the potential to increase profits for producers and at the same time benefit our country's advanced carbon materials and advanced energy storage industries. Research in biomass technology is needed to enhance the energy security of the United States.

Land prices, weather patterns, and new technologies are all reasons that there is an increased interest in drainage tiling to help solve moisture problems. Before tiling land that is enrolled in farm programs, a wetland determination needs to be done. There are technical, environmental, and legal concerns that must

be considered, and without the proper knowledge, a lot can go wrong.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Extension
- Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

We Assume:

- Microbial strains can fix dnitrogen and break down components of lignocellulose
- Supercapacitors will eventually replace batteries in tractors and electric cars
- Carbon dioxide from ethanol production can be used to create a new source of biomass
- Weather patterns will continue to create moisture problems for landowners

2. Ultimate goal(s) of this Program

Goals:

- Better understand how to optimize nitrogenase activity
- Obtain knowledge for the fabrication of porous graphene
- Increase profits for farmers
- Increase profits of ethanol production while meeting energy demands
- Increase usability of land in a safe, legal, and environmentally friendly manner

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	9.7	0.0	3.3	0.0
2018	9.7	0.0	3.3	0.0
2019	9.7	0.0	3.3	0.0
2020	9.7	0.0	3.3	0.0
2021	9.7	0.0	3.3	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

- Conduct Research to Characterize Microbial Samples
- Conduct Research to Produce Graphene from Biochar
- Conduct Research to Create New Sources of Biomass
- Conduct Drainage and Water Management Design Workshops

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
<ul style="list-style-type: none"> • Education Class • Workshop • Group Discussion • Demonstrations 	<ul style="list-style-type: none"> • Newsletters • Web sites other than eXtension • Other 1 (social media)

3. Description of targeted audience

- Researchers
- Supercapacitor and Energy Industries
- Biofuel Industry
- Scientists
- Farmers
- Landowners
- Drainage Contractors

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
 - Direct Adult Contacts
 - Indirect Adult Contacts
 - Direct Youth Contacts
 - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Percentage of all Hatch Research Projects in Agricultural, Natural Resource, and Biological Engineering
 - Number of Subsurface Drainage Design and Water Management Workshops
 - Number of Publications Posted on iGrow Website
 - Number of Articles Posted on iGrow Website
 - Number of Podcasts Posted on iGrow Website
 - Number of Radio Programs Posted on iGrow Website
 - Conduct Research to Characterize Microbial Samples
 - Conduct Research to Create New Sources of Biomass
 - Conduct Research on Carbon Materials and Biofuel Technologies
- Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Number of Agricultural, Natural Resource, and Biological Engineering Hatch Research Projects
2	Number of Subsurface Drainage Design and Water Management Workshop Participants
3	Enhance Understanding of Bio-renewable Graphene Production

Outcome # 1

1. Outcome Target

Number of Agricultural, Natural Resource, and Biological Engineering Hatch Research Projects

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 404 - Instrumentation and Control Systems
- 403 - Waste Disposal, Recycling, and Reuse
- 401 - Structures, Facilities, and General Purpose Farm Supplies
- 405 - Drainage and Irrigation Systems and Facilities
- 402 - Engineering Systems and Equipment

4. Associated Institute Type(s)

- 1862 Research

Outcome # 2

1. Outcome Target

Number of Subsurface Drainage Design and Water Management Workshop Participants

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 405 - Drainage and Irrigation Systems and Facilities

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 3

1. Outcome Target

Enhance Understanding of Bio-renewable Graphene Production

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 403 - Waste Disposal, Recycling, and Reuse

4. Associated Institute Type(s)

- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Competing Programmatic Challenges

Description

Climate variability in South Dakota can be extreme. Drought and blizzards are very common, which can cause programming and resources to be redirected.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

Nothing to Report

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Food and Non-Food Products: Development, Processing, Quality, and Delivery

2. Brief summary about Planned Program

Food and Non-Food Products: Development, Processing, Quality, and Delivery

The research activities in this program are primarily supported by our Department of Agricultural and Biosystems Engineering, Department of Dairy Science, and our Department of Biology and Microbiology. Hatch funded projects include but are not limited to third generation fuels from biomass or carbon dioxide, medicinal uses of native plants, the conversion of lignocellulosic biomass into advanced liquid biofuels, the manufacture of new dairy food products, technologies for improving food safety, and the development of oilseed biofuels. Activities for SDSU Extension in this Planned Program include Barbeque Bootcamp.

3. Program existence : Intermediate (One to five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
501	New and Improved Food Processing Technologies	0%		14%	
502	New and Improved Food Products	0%		17%	
504	Home and Commercial Food Service	80%		0%	
511	New and Improved Non-Food Products and Processes	0%		69%	
703	Nutrition Education and Behavior	10%		0%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	10%		0%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Oilseed crops have enormous potential for use in a variety of biofuel markets. The biofuels industry provides opportunities for rural economic growth while reducing our dependence on foreign oil. Protein is one of the most valuable components of milk. Today, the world demand for dairy protein exceeds the world supply. The U.S. dairy industry needs to identify and isolate valuable components of

milk that can be converted into a variety of shelf stable products.

The challenge today of producing enough food, fiber and fuel for more than 9.5 billion people by 2050 is almost daunting, especially because it needs to be done using less land, less water and less energy than is used today. Science driven technologies must be developed for this to be accomplished in a sustainable manner.

In recent years, there has been a lot of negative information surrounding consumer meats. Often times this information is incorrect or misleading, leaving the consumer grasping for answers.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research
- Multistate Extension
- Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

We Assume:

- New bioconversion technologies can produce valuable chemicals biomass processing
- The world demand for dairy protein exceeds the world supply of dairy protein
- Biomass can be converted into biofuels through viable conversion technologies
- Grain fed beef in the United States maintains a competitive edge in the marketplace
- The biofuel industry provides opportunities for agricultural diversification
- Consumers are increasingly looking for products with added health benefits
- High pressure pasteurization and ultrasound processing can make food safer and better

2. Ultimate goal(s) of this Program

Goals:

- Increase ethanol industry profit from value-added co-products
- Develop manufacturing processes for protein based dairy ingredients
- Meet the growing demand of transportation fuel
- Increase cattle producer profitability by augmenting beef tenderness
- Develop an oilseed based biofuel industry in the Northern Great Plains of North America
- Increase dairy production by creating products with nutritionally added-value benefits
- Advance technologies for the purpose of improving food safety, quality, and security

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
		1862	1890	1862

2017	3.2	0.0	11.7	0.0
2018	3.2	0.0	11.7	0.0
2019	3.2	0.0	11.7	0.0
2020	3.2	0.0	11.7	0.0
2021	3.2	0.0	11.7	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

- Evaluate Native Plants for Medicinal Uses
- Conduct Research to Enhance the US Dairy and Food Industry
- Conduct Research on Co-products of Corn and Soybeans
- Research and Improve Biofuel Production Processes
- Conduct BBQ Bootcamp Workshops
- Partner with South Dakota Beef Industry Council
- Partner with South Dakota Pork Producer's Council

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
<ul style="list-style-type: none"> • Education Class • Workshop • Demonstrations 	<ul style="list-style-type: none"> • Newsletters • Web sites other than eXtension

3. Description of targeted audience

- Native Americans
- US Dairy Industry
- Farmers
- Biofuels Industry
- Beef Science Community
- Beef Producers
- Food Businesses
- Consumers

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
 - Direct Adult Contacts
 - Indirect Adult Contacts
 - Direct Youth Contacts
 - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Percentage of all Hatch Research Projects in Food and Non-Food Products: Development, Processing, Quality, and Delivery
- Developed a Strong Research Program to Enhance the US Dairy and Food Industry
- Extract and Analyze Oilseeds to Determine Biofuel Production Suitability
- Number of BBQ Bootcamp Workshops
- Number of Publications Posted on iGrow Website
- Number of Articles Posted on iGrow Website
- Number of Podcasts Posted on iGrow Website
- Number of Radio Programs Posted on iGrow Website
- Conduct Research to Utilize Milk Components in Dairy Products

Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Number of Food and Non-Food Products: Development, Processing, Quality, and Delivery Hatch Research Projects
2	Increase Knowledge of Structure-Function Relationships of Milk Proteins
3	Increase Knowledge for Obtaining Maximum Oil Yields
4	Number of BBQ Bootcamp Participants

Outcome # 1

1. Outcome Target

Number of Food and Non-Food Products: Development, Processing, Quality, and Delivery Hatch Research Projects

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 511 - New and Improved Non-Food Products and Processes
- 501 - New and Improved Food Processing Technologies
- 502 - New and Improved Food Products

4. Associated Institute Type(s)

- 1862 Research

Outcome # 2

1. Outcome Target

Increase Knowledge of Structure-Function Relationships of Milk Proteins

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 501 - New and Improved Food Processing Technologies
- 502 - New and Improved Food Products

4. Associated Institute Type(s)

- 1862 Research

Outcome # 3

1. Outcome Target

Increase Knowledge for Obtaining Maximum Oil Yields

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 511 - New and Improved Non-Food Products and Processes

4. Associated Institute Type(s)

- 1862 Research

Outcome # 4

1. Outcome Target

Number of BBQ Bootcamp Participants

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 703 - Nutrition Education and Behavior
- 504 - Home and Commercial Food Service
- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

4. Associated Institute Type(s)

- 1862 Extension

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Description

Climate variability in South Dakota can be extreme. Drought and blizzards are very common, which can cause programming and resources to be redirected.

With the dairy industry expanding in South Dakota, the Hispanic workforce continues to grow. There is also a small growth of Karen in parts of the state that could continue to expand.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

SDSU Extension will continue to conduct surveys as stated in the Evaluation Results section of the Annual Report.

State Defined Outcome #4
Survey:
BBQ Bootcamp

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Economics, Markets, and Policy

2. Brief summary about Planned Program

Economics, Markets, and Policy

The research activities in this program are supported by our Department of Economics. Hatch funded projects include but are not limited to economic impacts of agricultural and trade policy issues, enhancing rural sustainability and quality of life, agricultural commodity prices, agricultural land market trends, enhancing the value of U.S. beef, and the economic impacts on wildlife and crop production from biofuel production. Activities for SDSU Extension in this Planned Program involve risk and business management, commodity marketing, costs of crop production, and the Ag CEO program.

3. Program existence : Intermediate (One to five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
601	Economics of Agricultural Production and Farm Management	34%		3%	
602	Business Management, Finance, and Taxation	40%		21%	
603	Market Economics	24%		14%	
604	Marketing and Distribution Practices	0%		25%	
605	Natural Resource and Environmental Economics	0%		12%	
607	Consumer Economics	0%		11%	
608	Community Resource Planning and Development	2%		0%	
609	Economic Theory and Methods	0%		3%	
610	Domestic Policy Analysis	0%		11%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

As the economy changes and new problems arise, research programs are needed to focus on the efficiency of crop and livestock sectors, sustainability of the food and fiber system, and rural development.

By the year 2050, producers will be charged with feeding nine billion people. With the changes to agriculture in the past years, and with rural America shrinking, new skills are needed for agricultural operations to remain viable and sustainable.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research
- Multistate Extension
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

We Assume:

- By the year 2050, producers will be charged with feeding nine billion people
- Agricultural land values and rental rates have an economic impact South Dakota
- Value-added agriculture is important to South Dakota
- Volatility in energy markets is also transmitted directly into agricultural markets
- There is risk and uncertainty in future commodity price movements
- There are financial risks with the changing slaughter cattle market
- Product price and product quality matter to the consumer

2. Ultimate goal(s) of this Program

Goals:

- Assure the sustainability of family agricultural operations
- Increase landowner profits
- Generate agriculture information for policy makers and rural residents
- Study the implications of converging agriculture, energy, and environmental policies
- Increase profits for farmers, elevators, and food processors
- Reduce financial risks for cattle producers
- Increase cattle production by increasing the quality of beef products

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	7.6	0.0	15.0	0.0
2018	7.6	0.0	15.0	0.0
2019	7.6	0.0	15.0	0.0
2020	7.6	0.0	15.0	0.0
2021	7.6	0.0	15.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

- Analyze Supply Chain Management Strategies
- Analyze Farm Real Estate Market Developments
- Analyze Agricultural Commodity Prices
- Research Trends and Financial Risks
- Develop Marketing Strategy Recommendations
- Conduct Ag Workshops

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
<ul style="list-style-type: none"> • Education Class • Workshop 	<ul style="list-style-type: none"> • Newsletters • Web sites other than eXtension

3. Description of targeted audience

- Agricultural Commodity Groups
- Policy Makers
- Environmental Groups
- Farmers, Ranchers
- Producers
- Ag Land Owners
- Women in Agriculture
- Youth
- Agricultural Leaders

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
 - Direct Adult Contacts
 - Indirect Adult Contacts
 - Direct Youth Contacts
 - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Percentage of all Hatch Research Projects in Economics, Markets, and Policy
- Number of Ag CEO Workshops
- Number of Publications Posted on iGrow Website
- Number of Articles Posted on iGrow Website
- Number of Podcasts Posted on iGrow Website
- Number of Radio Programs Posted on iGrow Website
- Conduct Research to Enhance Rural Sustainability and Quality of Life
- Conduct Farm Bill Training

Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Number of Economics, Markets, and Policy Hatch Research Projects
2	Number of New Participants in the Ag CEO Program
3	Enhance Sustainability and Quality of Life in Rural South Dakota

Outcome # 1

1. Outcome Target

Number of Economics, Markets, and Policy Hatch Research Projects

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 604 - Marketing and Distribution Practices
- 602 - Business Management, Finance, and Taxation
- 610 - Domestic Policy Analysis
- 609 - Economic Theory and Methods
- 603 - Market Economics
- 607 - Consumer Economics
- 605 - Natural Resource and Environmental Economics

4. Associated Institute Type(s)

- 1862 Research

Outcome # 2

1. Outcome Target

Number of New Participants in the Ag CEO Program

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 605 - Natural Resource and Environmental Economics
- 602 - Business Management, Finance, and Taxation
- 603 - Market Economics
- 608 - Community Resource Planning and Development

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 3

1. Outcome Target

Enhance Sustainability and Quality of Life in Rural South Dakota

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 602 - Business Management, Finance, and Taxation

4. Associated Institute Type(s)

- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Description

Climate variability in South Dakota can be extreme. Drought and blizzards are very common, which can cause programming and resources to be redirected.

With the dairy industry expanding in South Dakota, the Hispanic workforce continues to grow. There is also a small growth of Karen in parts of the state that could continue to expand.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

SDSU Extension will continue to conduct surveys as stated in the Evaluation Results section of the Annual Report.

State Defined Outcome # 6 (reported in Planned Program 3 - Animals and Their Systems)

Survey:

Dairy Farm Bill Training - Margin Protection Program

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

Human Nutrition, Food Safety, and Human Health and Well-Being

2. Brief summary about Planned Program

Human Nutrition, Food Safety, and Human Health and Well-Being

The research activities in this program are supported by our partnership with the College of Education and Human Sciences. Hatch funded projects include research involving dietary bioactive food components, rural food environment, intervention to improve healthful behaviors in young adults, and dietary influences on obesity and chronic inflammation. Activities for SDSU Extension involve gerontology, healthy eating and physical activity, worksite wellness, food processing and food marketing, chronic diseases, community and school gardens, and gardening and farmers markets for refugees.

3. Program existence : Intermediate (One to five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
701	Nutrient Composition of Food	0%		5%	
702	Requirements and Function of Nutrients and Other Food Components	2%		39%	
703	Nutrition Education and Behavior	29%		36%	
704	Nutrition and Hunger in the Population	32%		1%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	13%		6%	
722	Zoonotic Diseases and Parasites Affecting Humans	0%		6%	
724	Healthy Lifestyle	24%		7%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Obesity is a major concern within the United States and specifically within South Dakota. It is related to poor nutrition, the lack of physical activity and increased sedentary behavior. Obesity has been associated with increased risk for many chronic diseases. To improve individual's health, scientific discoveries need to be found and translated to practice.

SDSU Extension has seen an increase in requests for information on gardening and home food preservation. With the resurgence in gardening and more people that want to sell home processed foods, the demand for USDA Food Preservation Guidelines has increased significantly.

The marketing of home processed and home-baked foods has gained popularity in South Dakota. Farmers Markets are an excellent outlet for entrepreneurs to sell their products, but health rules and regulations must be followed closely to insure the safety of consumers.

Youngsters in the 5th and 6th grade typically do not have good health habits without some form of intervention. In South Dakota, 32.5% of youth age 5-19 are overweight or obese. Physical inactivity, poor nutrition, and obesity are major contributors to health problems and chronic diseases.

South Dakota American Indian children have higher than average health risks for obesity and diabetes. Adopting a healthy diet and active lifestyle can decrease the chances for these at-risk children to develop these diseases. Education at an early age, in a culturally sensitive way, and with repeated exposure encourages adoption of healthy practices.

Senior citizens often are not aware of the services available to them that assist in healthy living or services that help them continue to live independently.

Senior citizens need to be involved in their communities to help them maintain their well-being. The Intergenerational Bonds program focuses on building and strengthening bonds between children and senior citizens.

The Centers for Disease Control estimates that each year 48 million Americans get sick from foodborne diseases. In South Dakota, it is estimated that in 2011, 337 hospitalizations and eight deaths resulted from foodborne illness.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research
- Multistate Extension
- Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

We Assume:

- Excessive weight gain increases the risk of developing serious diseases
- Health is directly related to nutritional status
- The resurgence in gardening has increased the demand for home food preservation

- The growing popularity of Farmer's Markets has increased demand for information
- Dissemination of nutritional information will produce healthier eating habits
- Children and adults will become more physically active with awareness education
- Elderly people want to stay involved in their communities
- Underserved audiences lack knowledge and skills in grocery shopping
- The number of cases of foodborne illness can be reduced

2. Ultimate goal(s) of this Program

Goals:

- Change behavior patterns in young adults
- Increase the consumption of safe and nutritious food
- Decrease the number of overweight and obese people in South Dakota
- Keep aging citizens healthy and active in their communities
- Decrease the number of cases of foodborne illness
- Decrease serious diseases

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	11.9	0.0	11.7	0.0
2018	11.9	0.0	11.7	0.0
2019	11.9	0.0	11.7	0.0
2020	11.9	0.0	11.7	0.0
2021	11.9	0.0	11.7	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

- Conduct Community Garden Workshops
- Conduct Research on Bioactive Food Components
- Conduct Research for the Prevention and Treatment of Obesity
- Conduct Research to Understand Nutrient-gene Interactions
- Teach Food Safety Programs
- Conduct Home Food Preservation Workshops
- Conduct Local Food Entrepreneur Programs
- Develop Nutrition and Physical Activity Curriculum
- Train Teens as Teachers
- Conduct Workshops for the Aging and Senior Citizens

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
<ul style="list-style-type: none"> ● Education Class ● Workshop ● Group Discussion ● One-on-One Intervention ● Demonstrations 	<ul style="list-style-type: none"> ● Newsletters ● Web sites other than eXtension ● Other 1 (Social Media)

3. Description of targeted audience

- Refugees from Asia and Africa
- Nutrition and Food scientists
- Health Educators
- Minority Audiences
- Food Entrepreneurs
- Consumers of Food Products
- Local Schools
- Youth
- Senior Citizens

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
 - Direct Adult Contacts
 - Indirect Adult Contacts
 - Direct Youth Contacts
 - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Percentage of all Hatch Research Projects in Human Nutrition, Food Safety, and Human Health and Well-Being
- Number of Food Processing and Food Marketing Events
- Number of Gerontology Events Presented
- Number of Healthy Living Events that Created Learning Opportunities
- Number of Publications Posted on iGrow Website
- Number of Articles Posted on iGrow Website
- Number of Podcasts Posted on iGrow Website
- Number of Radio Programs Posted on iGrow Website
- Number of Garden Development or Enhancement Workshops and Webinars Conducted
- Increase Quality of Life for Refugees in South Dakota
- Conduct Research on the Role of Vitamin D, Calcium and Bioactive Food Components
- Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Number of Human Nutrition, Food Safety, and Human Health and Well-Being Hatch Research Projects
2	Number of Food Processing and Food Marketing Participants
3	Increase Knowledge of Aging Issues to Participants
4	Number of Participants Involved in Healthy Living Learning Opportunities
5	Number of Community or School Gardens Receiving Assistance with Development or Enhancement
6	Number of New Roots for New Americans Program Participants
7	Prevent Obesity and Obesity Related Disorders

Outcome # 1

1. Outcome Target

Number of Human Nutrition, Food Safety, and Human Health and Well-Being Hatch Research Projects

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 724 - Healthy Lifestyle
- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
- 703 - Nutrition Education and Behavior
- 704 - Nutrition and Hunger in the Population
- 702 - Requirements and Function of Nutrients and Other Food Components
- 701 - Nutrient Composition of Food

4. Associated Institute Type(s)

- 1862 Research

Outcome # 2

1. Outcome Target

Number of Food Processing and Food Marketing Participants

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 3

1. Outcome Target

Increase Knowledge of Aging Issues to Participants

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 703 - Nutrition Education and Behavior
- 724 - Healthy Lifestyle

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 4

1. Outcome Target

Number of Participants Involved in Healthy Living Learning Opportunities

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 703 - Nutrition Education and Behavior
- 724 - Healthy Lifestyle
- 702 - Requirements and Function of Nutrients and Other Food Components

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 5

1. Outcome Target

Number of Community or School Gardens Receiving Assistance with Development or Enhancement

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 704 - Nutrition and Hunger in the Population

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 6

1. Outcome Target

Number of New Roots for New Americans Program Participants

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 704 - Nutrition and Hunger in the Population

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 7

1. Outcome Target

Prevent Obesity and Obesity Related Disorders

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 702 - Requirements and Function of Nutrients and Other Food Components

4. Associated Institute Type(s)

- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Description

Climate variability in South Dakota can be extreme. Drought and blizzards are very common, which can cause programming and resources to be redirected.

With the dairy industry expanding in South Dakota, the Hispanic workforce continues to grow. There is also a small growth of Karen in parts of the state that could continue to expand.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

Nothing to Report

V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Families, Youth and Communities

2. Brief summary about Planned Program

Families, Youth, and Communities

The research activities in this program are supported by our partnership with College of Education and Human Sciences. The Hatch funded project is research that involves psychological and behavioral factors that impact the decision to save financially. Activities for SDSU Extension involve 4-H and Youth Development, women in agriculture, estate and transition planning, family financial wellness, Native American events, rural sustainability, and building community capacity.

3. Program existence : Intermediate (One to five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
205	Plant Management Systems	6%		0%	
704	Nutrition and Hunger in the Population	3%		0%	
801	Individual and Family Resource Management	31%		100%	
802	Human Development and Family Well-Being	7%		0%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	4%		0%	
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	4%		0%	
806	Youth Development	45%		0%	
	Total	100%		100%	

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Many young people are leaving rural South Dakota for opportunities in urban areas. Rural communities need access to resources and tools that attract people of all ages to live in their communities.

There are concerns that the savings rate of American households, especially low and moderate income households is inadequate, leaving families extremely vulnerable to economic setbacks. Additionally, research indicates that there is a link between financial security and over-all health. Unhealthy families are not able to fully socially and economically contribute to their communities.

Small businesses represent approximately 60% of all jobs nationally and are a large part of South Dakota's economy. Small businesses need educational resources, but often times it is not easily accessible.

Teenagers have the potential to become great leaders for their families, careers or communities, but need to be exposed to activities that teach them skills.

Poverty on the reservation has long been a major problem. Much of the land on South Dakota Indian Reservations is operated by non-Native American producers or is not being sustainably utilized at all. Few Native American beginning farmers/ranchers have adequate financial resources to invest in further education beyond local attendance at short courses.

With 82% of parents in South Dakota working, children are less supervised and parents often lack the tools or the time to teach character development. Today's youth are continually exposed to negative role models and high risk behaviors, leading to higher incidences of bad decision making.

2. Scope of the Program

- In-State Extension
- In-State Research
- Multistate Research
- Multistate Extension
- Integrated Research and Extension
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

We Assume:

- Mental and physical health and economic status affect quality of life for rural families
- Low and moderate income families have inadequate savings
- Rural communities need educated citizens for sustainability and growth
- Small businesses will continue to employ a high percentage of South Dakotans
- Teenagers will reach their full potential if exposed to the right skills
- Younger children look up to teenagers and learn well from them
- Native Americans want out of poverty

- Youth make poorer decisions when less supervised
- Rural America is shrinking

2. Ultimate goal(s) of this Program

Goals:

- Improve and strengthen the vitality and sustainability of rural communities
- Create jobs and reduce unemployment
- Reverse the shrinking of rural America
- Create young leaders for future needs
- Create robust learning environments for youth
- Decrease the number of overweight and obese youth in South Dakota
- Increase healthy eating behaviors in our youth
- Increase the number of Native American farmers and ranchers
- Develop lasting, good character in our youth
- Reverse the disconnect between our citizens and agriculture

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2017	42.1	0.0	1.7	0.0
2018	42.1	0.0	1.7	0.0
2019	42.1	0.0	1.7	0.0
2020	42.1	0.0	1.7	0.0
2021	42.1	0.0	1.7	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

- Research that Examines Financial Savings Behavior
- Build Community Capacity
- Conduct Activities on Native American Reservations
- Promote Financial Literacy
- Conduct Leadership Workshops
- Deliver Healthy Living Programs
- Conduct Workshops on Indian Reservations in Western South Dakota
- Conduct Character Education Program Training
- Develop and Enhance Community and School Gardens

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
<ul style="list-style-type: none"> ● Education Class ● Workshop ● Group Discussion ● One-on-One Intervention ● Demonstrations 	<ul style="list-style-type: none"> ● Newsletters ● Web sites other than eXtension ● Other 1 (social media)

3. Description of targeted audience

- Low to Moderate Income Families
- Rural Communities
- Entrepreneurs
- Youth
- Teenagers
- Native Americans
- Consumers of Food Products
- Local Schools
- Youth Program Leaders

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
 - Direct Adult Contacts
 - Indirect Adult Contacts
 - Direct Youth Contacts
 - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Percentage of all Hatch Research Projects in Families, Youth and Communities
- Number of Teens Trained in the Teens as Teachers Program
- Number of High School Students Selected as 4-H Hometown Hero Representatives
- Number of Communities Hosting the Ripple Effect Mapping
- Number of Events Conducted on Native American Reservations
- Number of Publications Posted on iGrow Website
- Number of Articles Posted on iGrow Website
- Number of Podcasts Posted on iGrow Website
- Number of Radio Programs Posted on iGrow Website
- Conduct Activities that Build Community Capacity
- Create Financial Literacy Learning Opportunities
- Conduct Character Education Programs and Activities
- Create Learning Opportunities for Youth
- Create Resource Management Learning Opportunities
- Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Number of Families, Youth and Communities Hatch Research Projects
2	Number of Students Taught by Teens as Teachers
3	Number of Elementary Students Impacted by 4-H Hometown Hero Representatives
4	Ripple Effect Mapping Participants
5	Number of Participants Involved in Native American Reservation Events
6	Enhance Rural Community Sustainability in South Dakota
7	Increase Family and Personal Financial Literacy to Participants
8	Build Good Character in South Dakota's Youth
9	Develop Life Skills for Youth
10	Increase Individual and Family Quality of Life

Outcome # 1

1. Outcome Target

Number of Families, Youth and Communities Hatch Research Projects

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 801 - Individual and Family Resource Management

4. Associated Institute Type(s)

- 1862 Research

Outcome # 2

1. Outcome Target

Number of Students Taught by Teens as Teachers

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 3

1. Outcome Target

Number of Elementary Students Impacted by 4-H Hometown Hero Representatives

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 4

1. Outcome Target

Ripple Effect Mapping Participants

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 5

1. Outcome Target

Number of Participants Involved in Native American Reservation Events

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- 205 - Plant Management Systems
- 806 - Youth Development
- 804 - Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 6

1. Outcome Target

Enhance Rural Community Sustainability in South Dakota

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 7

1. Outcome Target

Increase Family and Personal Financial Literacy to Participants

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 801 - Individual and Family Resource Management

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 8

1. Outcome Target

Build Good Character in South Dakota's Youth

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 9

1. Outcome Target

Develop Life Skills for Youth

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Extension

Outcome # 10

1. Outcome Target

Increase Individual and Family Quality of Life

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 801 - Individual and Family Resource Management

4. Associated Institute Type(s)

- 1862 Extension

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Description

Climate variability in South Dakota can be extreme. Drought and blizzards are very common, which can cause programming and resources to be redirected.

With the dairy industry expanding in South Dakota, the Hispanic workforce continues to grow. There is also a small growth of Karen in parts of the state that could continue to expand.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

SDSU Extension will continue to conduct surveys as stated in the Evaluation Results section of the Annual Report.

State Defined Outcome # 6

Survey:

Writing Your Future Grant Writing Conference

State Defined Outcome # 7

Survey:

Growing Financial Wellness

State Defined Outcome # 7

Survey:

Student Loan Repayment Education

State Defined Outcome # 9

Survey:

Developing Life Skills