

2015 South Dakota State University Combined Research and Extension Annual Report of Accomplishments and Results

Status: Accepted

Date Accepted: 06/07/2016

I. Report Overview

1. Executive Summary

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. SDSU Extension's online teaching platform, iGrow, had 643,072 users during this reporting period.

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 environmental impacts on grasslands, climate variability, the impact on crops from Canada geese, watershed management, soil productivity, bioenergy, wildlife habitat, carbon sequestration, 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 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 Farm Bill training for dairy producers, 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 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 enhancing rural sustainability and quality of life, research involving agricultural commodity prices, energy and the environment, agricultural land market trends, 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, and costs of crop production.

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 wellness for women with military connections, 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.

The following SDSU Extension activities and projects are also part of the Planned Programs, but they are not mentioned in the state defined outputs or outcomes. They help explain our programming efforts.

Food and Families

- Smarter Lunchroom Coach - creating healthier school lunch environments
- National Food Safety Conference - presentations in Arlington, VA
- TeachSD - intergenerational technology, bridging the gap with teens helping the elderly
- National Health Action Teams - making a difference for individuals, families and communities
- Yoga for Kids - interactive training in Pierre, SD
- Coalition on Aging - presentation in Sioux Falls, SD
- Community Needs Assessment - GPS enabled cameras capture the community
- Beyond the Boomer - population aging presentation

Native American Programs

- Expanding Economies in the New Native America - presentations in Deadwood, SD
- Wellness Conference - presentation including the current diabetes epidemic in Indian Country
- Beginning Farmer and Rancher program - increase capacity for Native American producers
- Healthy Food, Families, and Communities - programming on reservations and tribal communities
- South Dakota Agriculture and Rural Leadership - assisted in a tour of the Rosebud Reservation
- Dupree Powwow - gardening consulting and vegetable seed distribution
- Indigenous Foods and Skills Festival - Eagle Butte, SD
- Traditional Foods Presentation - presented to the tribal Wisdom Keepers elderly program

Community Development

- Stronger Economies Together - assess SET training in Virginia to assist the USDA
- Multicultural Leadership Dialogue - state-wide dialogue in Mitchell, SD
- Inspiring Leaders Program - economic development professionals
- Ripple Effect Mapping - analysis of an evaluation tool in Pierre, SD
- Outdoor Youth Challenge - partnered with SD Game, Fish and Parks in Lemmon, SD
- Bridging the Skills Gap - multistate activity for workforce development
- SD Municipal League Conference - Community Development booth in Spearfish, SD
- Pros and Cons of the Keystone XL Pipeline - forum co-hosted via Skype, Hawaii Pacific University

Ag and Natural Resources

- Raising Your Best Cattle Ever - workshops on raising dairy calves
- Dairy Toolbox Talks - farm worker basics presented in Spanish
- Quality Assurance Program - in-person certification trainings for beef cattle and pigs
- Annual Forage Grazing - demonstration projects with beef cattle
- Wheat Health Project - on farm trials to grow healthy wheat
- USDA Climate Hub - provides climate and agriculture Extension services to the USDA
- Beef Feedlot Roundtable - multistate Internet seminar series
- US Grains Council - promoting the development of export markets

4-H Youth Development

Western National Roundup • FCCLA • Camp Bob Marshall • Shooting Sports • 4-H Dog Show
South Dakota State Fair • Performing Arts • Teen Leadership Conference • Livestock Judging
Achievement Days • 4-H Rodeo • Life Skills Training • Robotics • KidQuest • iGrow Readers
Forensics Fun • Technology, Engineering and Math (STEM) • Power People • Rockets Day
Photography Workshop • Harvest of the Month • Rural Safety • Lego Club • Kids Take Stock
Teens as Teachers • Science Day • Horse Camp • Jewelry Workshop • 4-H Military Program

Total Actual Amount of professional FTEs/SYs for this State

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	127.3	0.0	200.2	0.0
Actual	108.0	0.0	167.0	0.0

II. Merit Review Process

1. The Merit Review Process that was Employed for this year

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

2. Brief Explanation

All Hatch projects are subjected to peer review prior to implementation and require independent peer reviews from two scientists. The department head or a departmental executive committee identifies peer reviewers. The department head and the AES Director serve as merit reviewers. Reviewers are required to comment on 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. Stakeholder Input

1. Actions taken to seek stakeholder input that encouraged 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
- 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.

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 was 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 was 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)
- 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, e.g., ag producers, or specific sub-audiences such as 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.

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. Stakeholder input is reviewed, considered and used as a basis to create SDSU Extension programs and AES research projects.

Brief Explanation of what you learned from your Stakeholders

SDSU Extension programming is tailored through stakeholder feedback. Examples include:

- Focus group - resulted in Maintaining Beef Cows on Dry Lots Conference
- Survey - resulted in multistate on-site dairy workshops
- Focus groups - led to programming that includes top issues affecting sheep producers
- Survey - led to programming for minority livestock producers

- Lenders input - resulted in Lender's Conference
- Producer requests - resulted in Northern States Beef Conference
- Request from SD Corn Council - resulted in presentation to Japanese group
- Food entrepreneur's request - resulted in programming focused on food business regulations
- Tribal request - resulted in food preservation class for native foods
- Request by local food producers - resulted in Dakota Food Hub
- Wellmark Foundation request - led to a workshop for community grants
- Bush Foundation request - resulted in Community Conversations Dialogue
- Request by communities - led to Badlands Bad River Regional Development Partnership
- Request by city of Webster - led to installation of a new weather station
- Request by city of Sioux Falls - led to relocating and adding of weather stations
- Request from Kyle Indian Health Service--resulted in workforce wellness program
- Foster Grandparent Program - resulted in Pine Ridge Reservation gardening workshops
- Community Surveys - resulted in five community garden projects on Rosebud Reservation

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
3683426	0	3159782	0

2. Totalled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	2646692	0	3171033	0
Actual Matching	2646692	0	3171033	0
Actual All Other	0	0	0	0
Total Actual Expended	5293384	0	6342066	0

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover				
	818132	0	834163	0

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

Reporting on this Program

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 (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	4.6	0.0	49.1	0.0
Actual Paid	6.5	0.0	36.7	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
158802	0	697627	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
158802	0	697627	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- 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. Brief description of the target audience

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

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	4404	344802	1595	1205

2. Number of Patent Applications Submitted (Standard Research Output)
Patent Applications Submitted

Year: 2015
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	10	33	43

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Percentage of all Hatch Research Projects in Natural Resources and Environment

Year	Actual
2015	22

Output #2

Output Measure

- Conduct Field Experiments to Determine the Impact of Adaptive Management Techniques on Carbon Sequestration and Energy Efficiency
 Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Increase Rancher's Knowledge of Grazing Techniques and Grassland Management

Year	Actual
2015	1

Output #4

Output Measure

- Number of CAFOs Participants

Year	Actual
2015	17

Output #5

Output Measure

- Number of Publications Posted on iGrow Website
Not reporting on this Output for this Annual Report

Output #6

Output Measure

- Number of Articles Posted on iGrow Website
Not reporting on this Output for this Annual Report

Output #7

Output Measure

- Number of Podcasts Posted on iGrow Website
Not reporting on this Output for this Annual Report

Output #8

Output Measure

- Number of Radio Programs Posted on iGrow Website
Not reporting on this Output for this Annual Report

Output #9

Output Measure

- Create Soil Health Learning Opportunities

Year	Actual
2015	17

Output #10

Output Measure

- Research Climate Variability and Management Impacts on South Dakota Grasslands

Year	Actual
2015	1

Output #11

Output Measure

- Conduct Field Research to Determine the Effectiveness of the Canada Goose Damage Program

Year	Actual
2015	1

Output #12

Output Measure

- Research Environmental Impacts on South Dakota Grasslands

Year	Actual
2015	1

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of Natural Resources and Environment Hatch Research Projects
2	Increase Knowledge Relative to Carbon and Residue Management
3	Number of Grazing School Participants
4	Number of CAFOs Training Sessions
5	Increase Soil Management Knowledge to Participants
6	Produce Knowledge to Implement a State-and-Transition Model for South Dakota Grasslands
7	Increase Knowledge to Control the Canada Goose Population
8	Improve the Understanding of the Environmental Implications on South Dakota Grasslands

Outcome #1

1. Outcome Measures

Number of Natural Resources and Environment Hatch Research Projects

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	24

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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.

What has been done

Within the College of Agricultural and Biological Sciences, there are 24 Hatch projects that are categorized in the Planned Program of Natural Resources and Environment. The research activities in this program are primarily supported by our Department of Natural Resource Management. Projects include but are not limited to research studies in environmental impacts on grasslands, climate variability, the impact on crops from Canada geese, watershed management, soil productivity, bioenergy, wildlife habitat, carbon sequestration, pollution prevention, and range management.

Results

Through research, our Department of Natural Resource Management continues to build a scientific knowledge base to improve and understand the management of natural resources in South Dakota. Examples include:

Streamflow trends under climate variability, atmospheric nitrogen deposition on native prairie, anthraquinone effectiveness on soybean plants, prevention of nitrates through tile drainage, newly discovered insect species, construct elemental fingerprints of reservoir ecosystems, climate change effects on beaver-created wetlands, and biomass yield from switchgrass land. In addition, graduate students gain valuable knowledge and skills while collaborating on research projects.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Increase Knowledge Relative to Carbon and Residue Management

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Number of Grazing School Participants

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	25

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

There are approximately 22 million acres of permanent pasture and rangeland in South Dakota. Rangeland is the lifeline of streams, ponds and lakes, and it is a source of wildlife habitat, recreation and scenic beauty. Rangeland is fragile and is profoundly impacted by management. The grazing lands of the Northern Plains are recognized as one of the most threatened ecosystems globally. As grazing lands are predominantly privately owned and managed, principally for livestock production, secure and profitable ranching is necessary to conserving this vital resource.

What has been done

In cooperation with the South Dakota Grasslands Coalition and several other entities, SDSU Extension has partnered in grasslands management training to more than 290 ranchers for the last 12 years. Ranchers participated in classroom presentations as well as hands-on field activities. SDSU Extension also co-hosted youth and adult rangeland events with 155 participants. The topics covered include plant identification, wildlife habitat development, prescribed burning, and ecological sites and soils. Many of the learning activities were designed for youth as young as 8 years of age.

Results

With its partners and the South Dakota Grazing School, SDSU Extension has helped producers of all ages become more skilled at reading their landscape. As new participants are reached, there is an increase in knowledge of many topics, including managing diversity on rangelands, pasture allocation, holistic management, soil health and infiltration, plant identification, and concepts of grazing. By better understanding the grassland conditions of their property, ranchers develop the skills needed to detect important information both beneficial and detrimental to their grasslands. The workshops and activities also allow producers to network, sparking creativity to help find solutions to their own challenges. By targeting many of the events to youth, SDSU Extension continues to help conserve South Dakota's fragile rangelands.

4. Associated Knowledge Areas

KA Code	Knowledge Area
101	Appraisal of Soil Resources
102	Soil, Plant, Water, Nutrient Relationships
121	Management of Range Resources

Outcome #4

1. Outcome Measures

Number of CAFOs Training Sessions

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	2

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Large-scale livestock producers, known as Concentrated Animal Feeding Operations (CAFOs), create potential water and air quality conflicts for rural communities in South Dakota. There is a need for the development of these operations, but environmental laws must be followed and good will with neighbors is imperative for the sustainability of large operations. Any CAFO that is applying for a General Permit must attend a CAFO Environmental Training Program.

What has been done

SDSU Extension, the South Dakota Department of Environment and Natural Resources, and the Natural Resources Conservation Service provide training for federal and state water pollution and control programs. Sessions included topics on livestock production, manure management and land application practices. SDSU Extension Specialists also discussed the management of nitrogen and phosphorus content of manure and air quality and odor. In a separate event, SDSU Extension facilitated a meeting for the proposed changes to CAFO General Permit.

Results

For the CAFO Environmental Training Programs provided, approximately two-thirds of the participants were required to be at the training sessions and the remaining third attended for the learning experience. The sessions represented approximately 7,700 animals in the beef industry, 8,900 animals in the dairy industry, and 9,300 animals in the swine industry. Survey results show a 20% to 35% increase in the overall understanding of the topics and an 86% overall satisfaction rate with the program. Over 70% of the participants who had not already adopted some of the practices demonstrated said they plan to adopt certain practices they learned.

For the Information Meeting, approximately half of the participants were current CAFO General Permit holders, and the rest of the audience was key stakeholders from both livestock industry and public sectors. Thirty-six of the 38 respondents were at least mostly satisfied with the information presented. Based on the participant's perceived level of understanding of various topics with varying degrees of applicability to the environment, the topics that are covered in the current Environmental Training Program generally ranked higher.

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation

Outcome #5

1. Outcome Measures

Increase Soil Management Knowledge to Participants

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	997

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

With the increase in demand for global food production, it is essential to promote soil health. The same management practices that can improve soil health can also damage soil health if not done correctly. Producers need access to all available tools and information to remain environmentally sound, profitable, and sustainable.

What has been done

SDSU Extension conducted multiple workshops, field days, agronomy courses, no-till demonstrations, and Integrated Pest Management training throughout South Dakota. Research is being conducted for state-wide recalibration of corn nitrogen recommendations and long-term no-till involving cover crops and no cover crops. Soybean phosphorus recommendation recalibration is also under way at many locations in the state.

Results

Producers and landowners gained knowledge that will not only encourage them, but will also challenge them to incorporate production practices that will help promote soil health. The increases in knowledge of fertilizers, pesticides, cover crops, and tillage practices help South Dakota's soil stay productive and profitable. The citizens of the state also benefit from better water quality and a better environment overall. Numerous articles have been written and posted on the iGrow learning platform.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships

Outcome #6

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Climate variability complicates our ability to manage invasive plants and pests, rangeland quality, and livestock production. Changes in grazing pressure are triggers that lead to alterations in rangeland productivity and plant community structure. To better describe these changes, a State-and-Transition Model for South Dakota Grasslands is needed.

What has been done

Research is ongoing to determine the impacts of climate variability, increased nitrogen deposition, and management on resistance and resilience to plant community change and primary production of eastern South Dakota grasslands. Clipping, fire, and nitrogen treatments were applied in the spring of 2015. Rainout shelters were deployed in the beginning of June through August to simulate a summer drought on the annual plots.

Results

The results of the research conducted in 2015 were presented to scientists, extension and government personnel, and grassland managers. Numerous Journal Articles, Conference Papers, and Theses/Dissertations were published in 2015. Clipping, fire, and nitrogen treatments will be repeated in the spring of 2016 and bud bank demographics of smooth brome grass will be determined throughout the growing season.

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources

Outcome #7

1. Outcome Measures

Increase Knowledge to Control the Canada Goose Population

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Since the early 1900's, there has been a rapid decline in Giant Canada geese in South Dakota. Through restoration programs, Canada geese populations today have increased to the point that farmers register complaints that the geese are damaging crops, particularly soybeans. Research is needed to generate harvest parameters and survival rates estimates for the Canada goose population.

What has been done

The SDGFP Canada goose damage program allows landowners that file a complaint free access to abatement techniques. Little research has been conducted on flightless Canada geese that cause crop damage during the brooding and molting period. Currently, South Dakota AES is evaluating the effectiveness of several commercial chemical goose deterrents on soybeans in northeast South Dakota. New methods to reduce crop damage caused by Canada geese are being identified.

Results

The third field season was completed. The chemical Anthraquinone was evaluated as a deterrent to crop damage caused by Canada geese. It was determined that if the first 200 feet of the crop field was sprayed adjacent to wetlands, crop damage by Canada geese would be reduced 80-90%. Brochures are being produced to be distributed to producers. One graduate student is currently working on his thesis regarding the research project. The field studies were observed by numerous biologists from state and Federal agencies.

4. Associated Knowledge Areas

KA Code	Knowledge Area
135	Aquatic and Terrestrial Wildlife

Outcome #8

1. Outcome Measures

Improve the Understanding of the Environmental Implications on South Dakota Grasslands

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

South Dakota is experiencing large-scale conversion of grassland to cropland. Increased land conversion combined with climate change will likely influence water availability and quality. Research is needed to quantify hydrologic and water quality impacts of land use and land cover change in the face of a changing climate in South Dakota.

What has been done

Research is being conducted through field monitoring, computer-based modeling, and established statistical techniques. The research includes trends and changes in streamflow, evaluation of water quantity and quality, and evaluation of the adoption of best management practices across different land use and land cover types in South Dakota.

Results

Through research, SDSU AES is getting a better understanding of South Dakota's grasslands and the implications of grassland depletion. The effectiveness of the field-based and watershed scale management strategies is being evaluated, which could mitigate nonpoint source pollution. The results of this research are being disseminated through conferences, peer-reviewed publications, outreach activities, and invited talks.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)
- Other (Weather in general)

Brief Explanation

Rain delayed soil sampling efforts for a soil fertility research project.

Government policies can create false economies that tend to encourage producers to use practices that are not always agronomically sound.

Winter meetings periodically coincide with poor driving conditions, making it a challenge for both participants and presenters to attend.

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(I). Planned Program (Evaluation Studies)

Evaluation Results

State Defined Outcome # 4

Post-workshop Survey:

Concentrated Animal Feeding Operations Training Program

15 of 17 Participant Responses

86% - Overall Participant Satisfaction with the Program

Understanding of the Topic before Program (average for two training session)

63% - Water Quality

60% - Permit

69% - Land Application

53% - Worksheets

60% - Conservation

52% - Nutrition

59% - Air Quality

Understanding of the Topic after Program

87% - Water Quality

90% - Permit

90% - Land Application
83% - Worksheets
88% - Conservation
82% - Nutrition
82% - Air Quality

Participants that Have Already Adopted Practices (average for two training sessions)

29% - Land Application
21% - Conservation
32% - Nutrition
18% - Air Quality

Percentage of Remaining Participants that Plan to Adopt Practices

93% - Land Application
89% - Conservation
73% - Nutrition
70% - Air Quality

State Defined Outcome # 4

Post-Meeting Survey:

Meeting for Proposed Changes to Concentrated Animal Feeding Operations

38 of 64 Participant Responses

Satisfaction with Meeting (1: Not at all; 2: Slightly; 3: Somewhat; 4: Mostly; 5: Completely)

Location - 4.6

Digital Presentation - 4.2

New Information - 3.5

Info Easy to Understand - 3.9

Completeness of Info - 4.0

Helpfulness of Info - 3.9

Ability to Participate Digitally - 4.4

Presenter Responses - 4.3

Key Items of Evaluation

State Defined Outcome # 4

Post-workshop Survey:

Concentrated Animal Feeding Operations Training Program

Survey results show a 20% to 35% increase in the overall understanding of the topics and an 86% overall satisfaction rate with the program.

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Plants and Their Systems

Reporting on this Program

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	Pathogens 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 (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	11.1	0.0	65.7	0.0
Actual Paid	10.8	0.0	46.8	0.0
Actual Volunteer	6.9	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
264669	0	887890	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
264669	0	887890	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Develop Improved Oat Cultivars
- Collaborate with Master Gardeners
- Develop Improved Wheat Cultivars
- Conduct Research on Economic Impacts of Fungal Diseases
- Develop Superior Sunflower Germplasms
- 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. Brief description of the target audience

- Home Gardeners
- Research Community
- Soybean Growers
- Wheat Growers
- Corn Growers
- Biofuels Crop Industry
- Producers
- Graduate Students
- Private and Commercial Pesticide Applicators
- Specialty Crop Growers
- Agronomy Professionals

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	21377	8567651	2284	1753

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2015

Actual: 3

Patents listed

1. Prevail (wheat PVP)
2. Redfield (wheat PVP)
3. Fusarium Head Blight Resistance Genes and Uses Thereof

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	1	9	10

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Percentage of all Hatch Research Projects in Plants and Their Systems

Year	Actual
2015	28

Output #2

Output Measure

- Identified Proteins in Corn and Wheat
- Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Number of Pesticide Applicator Training Sessions

Year	Actual
2015	123

Output #4

Output Measure

- Number of Master Gardener Training Sessions

Year	Actual
2015	35

Output #5

Output Measure

- Number of IPM Training Events Conducted

Year	Actual
2015	0

Output #6

Output Measure

- Increase Pollinator and Pollinator Habitat Knowledge
Not reporting on this Output for this Annual Report

Output #7

Output Measure

- Number of Publications Posted on iGrow Website
Not reporting on this Output for this Annual Report

Output #8

Output Measure

- Number of Articles Posted on iGrow Website
Not reporting on this Output for this Annual Report

Output #9

Output Measure

- Number of Podcasts Posted on iGrow Website
Not reporting on this Output for this Annual Report

Output #10

Output Measure

- Number of Radio Programs Posted on iGrow Website
Not reporting on this Output for this Annual Report

Output #11

Output Measure

- Conduct Research on Spring Wheat Cultivars

Year	Actual
2015	1

Output #12

Output Measure

- Conduct Research for Improved Oilseed Production

Year	Actual
2015	1

Output #13

Output Measure

- Conduct Research on Oat Cultivars

Year	Actual
2015	1

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of Plants and Their Systems Hatch Research Projects
2	Enhance the Understanding of Biotic and Abiotic Stress Resistance in Crop Plants
3	Number of Pesticide Applicator Training Participants
4	Number of Participants Completing Master Gardener Training
5	Number of IPM Participants
6	Number of Citizen Science Volunteers
7	Release Spring Wheat Cultivars
8	Increase Oilseed Crop Knowledge and Productivity and Profitability
9	Develop and Release Oat Cultivars

Outcome #1

1. Outcome Measures

Number of Plants and Their Systems Hatch Research Projects

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	28

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Crop diseases, insect pests, drought, changing climatic conditions, soil erosion, and fewer acres of land available for farming are all serious production constraints for all crops produced in South Dakota.

What has been done

Within the College of Agricultural and Biological Sciences, there are 28 Hatch projects that are categorized in the Planned Program of 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. 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.

Results

Through research, we continue to build a scientific knowledge base to improve and understand plant varieties, increased agricultural productivity, plant diseases, and the impacts of tillage on soil carbon levels. Examples include:

Engineered cyanobacteria to produce biofuels and commodity chemicals, new releases of oat and wheat cultivars, the development of high yield, pest resistant sunflower, oil extraction from oilseeds for biofuel production, soybean plants that produce more of its own nitrogen, and improve efforts to extend carbon assimilation of switchgrass. In addition, graduate students gain valuable knowledge and skills while collaborating on research projects.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Enhance the Understanding of Biotic and Abiotic Stress Resistance in Crop Plants

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Number of Pesticide Applicator Training Participants

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	4702

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Producers planning to apply any pesticide to a commodity worth \$1,000 or more must be certified

as a private applicator. Anyone that applies pesticides for hire must be certified and licensed as a commercial applicator.

What has been done

SDSU Extension organized and participated in 67 commercial applicator sessions and 56 private applicator training sessions across the state. Fifteen commercial categories were covered. Speakers at the sessions included SDSU Extension Specialists, State Department of Agriculture representatives, and State Department of Environment and Natural Resources.

Results

Participants enhanced their knowledge and understanding of safe and sustainable methods to apply pesticides. Topics covered during these trainings include proper selection of personal protective equipment, understanding and comprehension of label languages, resistance development on weeds and insects and ways to prevent its development, proper technique to measure pesticides and calibrate pesticide application equipment.

4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants

Outcome #4

1. Outcome Measures

Number of Participants Completing Master Gardener Training

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	64

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

High food costs and the lack of ability in small rural communities to obtain high quality fresh fruits and vegetables have led to the need for increased garden education. Schools, community groups, the elderly, and service groups have requested information on basic gardening skills, assistance with starting gardens, and having basic garden questions answered. Home gardeners also want to know how to better take care of their yards and the plants growing in them.

What has been done

The Master Gardener program provides horticulture training to individuals who then volunteer in their communities ? teaching neighbors, friends and others valuable gardening skills. Hands-on learning is an important part of the program, but the addition of online training allows more people to be reached, especially in remote locations. Sixty-four Master Gardeners completed the training and are now engaged in the volunteer service in their communities.

Results

Through the close partnership of SDSU Extension and Master Gardeners, citizens across South Dakota have access to public education that enables them to improve their health and lifestyle by growing nutritious foods. Adults and youth have gained confidence that their gardening skills are based on accurate, research-based information. By growing their own food, gardeners are saving money, eating fresher produce, and making their own decisions about pesticide use. During this reporting period, Master Gardeners volunteered over 14,200 hours, a value of approximately \$270,360.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

Outcome #5

1. Outcome Measures

Number of IPM Participants

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
216	Integrated Pest Management Systems

Outcome #6

1. Outcome Measures

Number of Citizen Science Volunteers

Not Reporting on this Outcome Measure

Outcome #7

1. Outcome Measures

Release Spring Wheat Cultivars

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

South Dakota's spring wheat producers desire cultivars that are adapted to a large geographic area, reliably produce high yields with little or no loss to disease or abiotic stress, and have acceptable test weight, protein levels, and other end-use qualities. Research in applied plant breeding methods is needed to develop and release cultivars that meet or exceed the expectations of South Dakota spring wheat producers.

What has been done

The SDSU spring wheat breeding and genetics program conducted applied and basic research focused on increasing grain yield and general agronomic performance potential of new spring

wheat cultivars. This was carried out through utilizing South Dakota growing environments to select and advance promising experimental breeding populations and lines that possess increased yield potential and stability, elevated levels of disease and abiotic stress resistance, as well as increased end-use quality parameter values.

Results

An illustration of economic impact, which results from genetic gain, can be developed through comparing the performance of Boost and Surpass with the performance of one that was released previously. 'Briggs' was released by this program in 2002 and was very popular among growers for several years. Over all AYT locations during years 2013 through 2015, both Boost and Surpass produced approximately 5.5 more bushels of grain per acre than Briggs. At a market value of \$5.00 per bushel, this equate to an advantage of \$27.50 per acre that is available to growers that choose to plant the new cultivars as opposed to continually growing Briggs. Although both consistently produce more grain than Briggs, they were largely released for their elevated levels of disease resistance.

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
202	Plant Genetic Resources
212	Pathogens and Nematodes Affecting Plants

Outcome #8

1. Outcome Measures

Increase Oilseed Crop Knowledge and Productivity and Profitability

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oilseed crops are important to South Dakota, which is currently the second leading producer of sunflower and flax in the United States. With a unique environment for sunflower production, South Dakota can benefit from genetic material specifically developed for this region. Other

oilseed crops such as camelina and Carinata show promise as feedstocks for the production of biodiesel or jet fuel.

What has been done

With its collaborators, SDSU AES conducted research on sunflower, flax and other oilseed crops. The purpose of the research is to provide research-based advice to growers on hybrid/variety selection, pest management strategies, and general production practices for maximizing seed yield, oil content, and crop quality with minimum inputs. Alternative oilseed crops were also tested to evaluate production potential suitable for biofuel feed stocks.

Results

Performance trial results of oil-type sunflower hybrids and confection hybrids, including seed yield, oil content, test weight, plant height, days to flower, lodging, and disease incidence were distributed through Extension bulletins and websites. Performance information on yield trials of flax varieties and experimental lines was made available to producers and agronomists through an Extension publication. The results will also be combined with other results from the flax growing regions in the U.S. and Canada to provide data for the release of new flax varieties. With camelina and carinata testing, growers gained knowledge through on-farm demonstration plots and field tours. Nitrogen fertility trial data of camelina and carinata was presented at the annual Ag Horizons conference and will be added to previously established data bases to support Life Cycle Analyses and provide information to support of crop insurance programs in South Dakota.

4. Associated Knowledge Areas

KA Code	Knowledge Area
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants

Outcome #9

1. Outcome Measures

Develop and Release Oat Cultivars

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	2

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oat is a low input crop which is used for forage, feed, food, and cover-crops. With the increased public awareness of oat health benefits, the food market for oat products is growing. To ensure that productive varieties meeting the needs of the multiple industries using oat are available to producers, it is essential to continue the genetic improvement of oat.

What has been done

Oat breeding activities were conducted to improve yield, yield stability, lodging resistance, test weight, disease resistance, and end-use quality. Approximately 300 new unique crosses combinations were made. Early generation populations were evaluated in the field and over 1000 new lines were derived. Approximately 300 lines were included either in the Preliminary or Advanced Yield Trials. Phenotypic data for various characteristics related to agronomic performance, disease resistance, and seed characteristics were collected at each stage of line development.

Results

Two new oat cultivars, Natty and Hayden, were released and made available to producers for the 2015 growing season. Natty and Hayden are white hulled oat cultivars which exhibit higher yield potential than the cultivars they are intended to replace. When evaluated over three growing seasons at multiple locations in South Dakota, Hayden yielded in average 13 bushels more per acre than Horsepower, a variety that has been widely grown in South Dakota. Similarly, Natty was developed as a replacement to the widely grown early maturing variety Shelby 427. When evaluated over three growing seasons and multiple locations in South Dakota, Natty produced in average 12 bushels more grain per acre than Shelby 427. In addition to high yield potential the two varieties exhibit high test weight. The release of Natty and Hayden is expected to increase producers' profitability.

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
202	Plant Genetic Resources
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
204	Plant Product Quality and Utility (Preharvest)
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Limited funding in research results in low success.

Unexpected early start to soybean harvesting has interfered with attendance at cover crop tours.

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(I). Planned Program (Evaluation Studies)

Evaluation Results

State Defined Outcome #7

Data Comparison:

Boost and Surpass Wheat Cultivars

New wheat cultivars Boost and Surpass produced approximately 5.5 more bushels of grain per acre than the previously released cultivar, Briggs. At a market value of \$5.00 per bushel, this equates to an advantage of \$27.50 per acre.

State Defined Outcome # 9

Data Comparison:

Hayden Oat Cultivar

New oat cultivar Hayden yielded in average 13 more bushels per acre than the previously released cultivar, Horsepower. At a market value of \$1.85 per bushel, this equates to an advantage of \$24.05 per acre.

Key Items of Evaluation

New Wheat and Oat Cultivars

Research at SDSU AES continues to release new grain cultivars that produce higher yields than previous releases. This results in higher profits for producers and increases the availability of quality food to feed the world.

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Animals and Their Systems

Reporting on this Program

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 (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	13.9	0.0	37.8	0.0
Actual Paid	16.2	0.0	40.1	0.0
Actual Volunteer	0.3	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
397004	0	761048	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
397004	0	761048	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- 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. Brief description of the target audience

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

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	5794	1207112	1889	1699

2. Number of Patent Applications Submitted (Standard Research Output)
Patent Applications Submitted

Year: 2015
 Actual: 2

Patents listed

1. Anterivirus Protein and Expression Mechanisms
2. Multiepitope Fusions Antigens and Vaccines and their use in Treatment of Enterotoxigenic Diarrhea

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	26	48	74

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Percentage of all Hatch Research Projects in Animals and Their Systems

Year	Actual
2015	24

Output #2

Output Measure

- Publish and Disseminate Results of Nutritional Studies in Sheep Diets

Year	Actual
2015	0

Output #3

Output Measure

- Number of Learning Activities for Sheep Producers or Consumers

Year	Actual
2015	9

Output #4

Output Measure

- Demonstrate Value-Based Marketing to Cow-calf Producers

Year	Actual
2015	0

Output #5

Output Measure

- Create Learning Opportunities in the Beef Industry

Year	Actual
2015	7

Output #6

Output Measure

- Number of Publications Posted on iGrow Website
Not reporting on this Output for this Annual Report

Output #7

Output Measure

- Number of Articles Posted on iGrow Website
Not reporting on this Output for this Annual Report

Output #8

Output Measure

- Number of Podcasts Posted on iGrow Website
Not reporting on this Output for this Annual Report

Output #9

Output Measure

- Number of Radio Programs Posted on iGrow Website
Not reporting on this Output for this Annual Report

Output #10

Output Measure

- Educate Producers with Information Impacting the Dairy Industry

Year	Actual
-------------	---------------

2015

17

Output #11

Output Measure

- Develop Approaches for Detection, Prevention and Control of Viral Diseases of Swine

Year

Actual

2015

0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

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 Measures

Number of Animals and Their Systems Hatch Research Projects

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	24

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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.

What has been done

Within the College of Agricultural and Biological Sciences, there are 24 Hatch projects that are categorized in the Planned Program of 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. Projects include but are not limited to research studies in 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.

Results

Through research, we continue to build a scientific knowledge base to improve and understand production efficiency and product enhancement, and to prevent and detect animal and human diseases. Examples include:

Growth-promoting implants in nursing calves, lamb finishing diets of soy hulls, DDG and treated corn stover, methods of controlling estrus and ovulation in cattle, heifer growth performance on reduced fat distillers dried grains, swine and bovine influenza viruses, and feeding strategies to optimize piglet quality and sow longevity. In addition, graduate students gain valuable knowledge and skills while collaborating on research projects.

4. Associated Knowledge Areas

KA Code	Knowledge Area
----------------	-----------------------

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

Outcome #2

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The rapidly expanding biofuels industry has increased the availability of co-product feeds for sheep. Co-product feeds such as soybean hulls, dried distillers grains, and glycerol are often more favorably priced than traditional feeds, but further evaluation is needed to determine the impact on performance, profitability, and efficiency of co-product based diets.

What has been done

A study was conducted with 48 crossbred lambs to evaluate the effect of corn stover on lamb growth performance and dry matter intake. The treatment diets were a corn grain based control diet and a pair of diets containing corn stover. All diets were pelleted and formulated to meet or exceed the lamb nutritional requirements.

Results

Final weight, average daily gain, and dry matter intake were similar for lambs fed the corn stover diets, however lambs fed the corn grain based control diet had greater feed efficiency compared to those offered the corn stover diets. The feed to gain for lambs fed the corn stover treatment diets was similar. Under circumstances when lamb diets are formulated with approximately equal parts of soy hulls, dried distiller grains, and a starch based energy feed ingredient, lamb morbidity and death loss increased due to digestive disorders. With a diet of similar parts of soy hulls, dried distillers grains, corn and 20% corn stover, no negative animal health conditions were observed. The investigators assume that the effective fiber properties of corn stover minimize the risk of digestive disorders associated with rumen function.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems

Outcome #3

1. Outcome Measures

Number of Individuals Participating in Sheep Production Learning Activities

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	905

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Sheep and lamb inventory in the United States has been declining over the last few decades. Producers nationwide need to grow their flocks to meet the demands of wool and high quality lamb meat and at the same time keep their operations sustainable. Many beginning operators have limited knowledge and resources for productive sheep enterprise operations, land use management, and business planning.

What has been done

With its partners, SDSU Extension continues to support the sheep industry with producer education programs. In particular, SDSU Extension's signature program sheepSD helps potential and beginning sheep ranchers enter and expand the sheep industry. The beginning ranchers

learn the skills needed for producer efficiency, profitability and sustainability. Extension and research personnel in the four-state region of SD, ND, WY and MT contribute to the success of the sheepSD participants.

Results

During 2015, SDSU Extension personnel were involved in many events, reaching more than 905 participants. Participants gained knowledge on many topics including grazing plans, sheep shearing, wool traits, technology in the sheep industry, the economic value of wool, the Sheep Safety and Quality Assurance program, and sheep management practices. Since 2012 when sheepSD began, a learning community called Growing South Dakota Sheep Producers was formed. This group of 57 people is comprised of sheep producers, loan officers, sheep shearers, and lamb marketing representatives who all have an interest in SDSU Extension. A mentorship program provides opportunities for beginning producers to connect with established producers. Attendance to the South Dakota Sheep Growers Association's Convention has grown from 54 attendees in 2012 to 185 in 2015.

4. Associated Knowledge Areas

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

Outcome #4

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	14

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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.

What has been done

SDSU Extension coordinated the Calf Value Discovery Program, a retained ownership program in which 14 cow-calf operations participated with 186 calves. The calves were vaccinated, dewormed, individually identified, and weighed. They were consigned to a local feed yard where they were fed in a single pen, visually evaluated and sold in semi-load lots.

Results

On average, feeding costs were \$447.62 per animal. This equates to a total cost of gain of \$78.00/100 lb. When carcasses were sold on a grid marketing basis, price ranged from \$1,067.68 to 2,166.79. When including the value of the feeder calf, there was a \$827.24 dollar per animal range in return from a loss of \$489.20 to a profit of \$338.04. However, on average total profit was a loss of \$36.19 per animal.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems
315	Animal Welfare/Well-Being and Protection

Outcome #5

1. Outcome Measures

Number of Individuals Participating in Beef Production Learning Activities

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	105

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

There are many opportunities in the beef industry, but there are also many risks involved. As the average age of agriculture producers in South Dakota continues to rise, the industry must recruit more young people. And to be competitive, beginning beef producers need relevant and timely

information in the areas of livestock production, natural resource stewardship, marketing, financial management, business, and risk and legal management.

What has been done

SDSU Extension launched one of its signature programs, beefSD, in 2010. The program equips beginning ranchers with the knowledge they need to help feed the world as the population continues to grow. Beginning ranchers participated in six major components of the program: workshop and classroom instruction, case studies, travel study trips, web-based instruction, feedlot performance of participant calves, and individualized training.

Results

Nearly 50 beginning beef producers have completed the beefSD program during the two classes of the two-year curriculum. In post program evaluations, the participants said that they are doing a lot of things now that they would not have done if they had not been part of the program. The beginning ranchers are keeping up with the industry, markets, and cattle health through frequent contacts with farmer-feeders and feedlot operators. They are meeting new people and finding new sources to reach out to for help. Networking is helping them to know who and where to look for solutions and answers. They are keeping better records, writing business plans, setting goals, and working on new avenues to market their livestock. And perhaps as important as anything, they are thinking outside the box; they are not doing the same old thing just because that's the way they have always done it.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems
315	Animal Welfare/Well-Being and Protection

Outcome #6

1. Outcome Measures

Sustain and Enhance Growth in Dairy Production

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	797

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Dairy producers face challenges of fluctuating feed costs and milk prices, public perception of labor management, and issues related to sustaining family farms and communities. Educational resources and opportunities are limited to producers and the dairy industry as a whole.

What has been done

SDSU Extension partners with many organizations to share research based information to the dairy industry. The I-29 Dairy Outreach Consortium is a multistate program that unites producers in the region. Participants share expertise and knowledge of dairy production and management practices through farm tours, workshops, expos, and demonstrations. Additionally, SDSU Extension collaborated with the USDA Farm Service to conduct Farm Bill Training for the Margin Protection Program for Dairy Producers.

Results

Approximately 797 participants at 17 events gained valuable dairy production knowledge; topics include profitability with healthy heifers, automated technology, nutritional management strategies, milk markets, public perception, stockmanship, and the USDA Farm Bill. The number of milk cows in South Dakota increased 13.3% during this reporting period, from 97,000 to 107,000. The average per cow production level also increased in 2015. South Dakota is listed by the USDA as one of the top 23 states due to overall total pounds of milk being produced by the state.

4. Associated Knowledge Areas

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

Outcome #7

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Porcine Reproductive and Respiratory Syndrome Virus has proven itself as a significant pathogen of swine in nearly all production areas of the world, along with other emerging diseases of swine. PRRS virus and other viruses are devastating not only to swine, but also the economies of the regions where they have emerged.

What has been done

This project is a multi-collaborative approach with other universities, scientists, producers and veterinarians to find methods of quick and effective detection, prevention and control. These methods include new vaccine design, development of licensed, sharable technologies for detection and routine surveillance, measurement of genetic diversity and immune parameters and methods for effective biosecurity.

Results

Research has led to accomplishments with the following viral diseases: porcine reproductive and respiratory syndrome virus, porcine epidemic diarrhea virus, swine influenza, and African swine fever. This project focuses on the major points that represent the current research priorities of the US swine industry. SDSU AES and its collaborators are leading the worldwide research community toward a feasible immunization strategy against African swine fever targeted to specific areas of the world, and continue its research to prevent the virus from being introduced in North America. The results of the research have been presented at symposiums, conferences, and to many stakeholder groups.

4. Associated Knowledge Areas

KA Code	Knowledge Area
311	Animal Diseases

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Other (Competing Operation Duties)

Brief Explanation

Participation in programming for sheep producers is influenced greatly by the participant's ability to get away from the farm or ranch operation. A learning community makes SDSU Extension programming accessible to producers who are unable to commit to the sheepSD program.

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(I). Planned Program (Evaluation Studies)

Evaluation Results

State Defined Outcome #4

Data Comparison:

Calf Value Discovery Program

On average, feeding costs were \$447.62 per animal. This equates to a total cost of gain of \$78.00/100 lb. When carcasses were sold on a grid marketing basis, price ranged from \$1,067.68 to 2,166.79. When including the value of the feeder calf, there was a \$827.24 dollar per animal range in return from a loss of \$489.20 to a profit of \$338.04. However, on average total profit was a loss of \$36.19 per animal.

State Defined Outcome # 6

Data Comparison:

South Dakota Dairies

Estimated Head of Milk Cows:

2014 - 97,000

2015 - 107,000

13.3% growth

Monthly Production Levels:

August 2014 - 1,855 pounds/cow/month

August 2015 - 1,905 pounds/cow/month

Slight increase

Key Items of Evaluation

South Dakota Dairies

Dairy producers, industry partners, SDSU Extension, and Extension from Minnesota, Iowa, North Dakota, and Nebraska have an established learning community to confront the challenges that the dairy industry faces. Through this collaborative effort, South Dakota's cow numbers and cow production levels continue to see growth.

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Agricultural, Natural Resource, and Biological Engineering

Reporting on this Program

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 (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	4.6	0.0	4.6	0.0
Actual Paid	9.7	0.0	3.3	0.0
Actual Volunteer	0.2	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
238202	0	63421	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
238202	0	63421	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- 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. Brief description of the target audience

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

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	2682	141303	1505	2986

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2015

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	23	23

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Percentage of all Hatch Research Projects in Agricultural, Natural Resource, and Biological Engineering

Year	Actual
2015	2

Output #2

Output Measure

- Number of Subsurface Drainage Design and Water Management Workshops

Year	Actual
2015	6

Output #3

Output Measure

- Number of Publications Posted on iGrow Website
Not reporting on this Output for this Annual Report

Output #4

Output Measure

- Number of Articles Posted on iGrow Website
Not reporting on this Output for this Annual Report

Output #5

Output Measure

- Number of Podcasts Posted on iGrow Website
Not reporting on this Output for this Annual Report

Output #6

Output Measure

- Number of Radio Programs Posted on iGrow Website
Not reporting on this Output for this Annual Report

Output #7

Output Measure

- Conduct Research to Characterize Microbial Samples

Year	Actual
2015	1

Output #8

Output Measure

- Conduct Research to Create New Sources of Biomass

Year	Actual
2015	1

Output #9

Output Measure

- Conduct Research on Carbon Materials and Biofuel Technologies

Year	Actual
2015	1

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

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 Measures

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

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	3

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Research in bioenergy technology is needed to enhance energy independence for the United States.

What has been done

Within the College of Agricultural and Biological Sciences, there are three Hatch projects that are categorized in the Planned Program of Agricultural, Natural Resource, and Biological Engineering. Projects include bio-renewable graphene production, lignocellulosic based bio fuel, and the development of microorganisms to facilitate composting of plant materials.

Results

Through research, our Department of Agricultural and Biosystems Engineering has continued to build its knowledge base that impacts new innovations and design systems in agriculture.

Examples include:

The transformation of biochar into graphene to be used in supercapacitor energy storage devices, development of biochemical or thermochemical pretreatment technologies that lead to the economical production of lignocellulosic based bio fuel, and to further characterize microbial samples that might have ability to both fix dinitrogen gas and break down some components of lignocellulose. In addition, graduate students gain valuable knowledge and skills while collaborating on research projects.

4. Associated Knowledge Areas

KA Code	Knowledge Area
401	Structures, Facilities, and General Purpose Farm Supplies
402	Engineering Systems and Equipment

- 403 Waste Disposal, Recycling, and Reuse
- 404 Instrumentation and Control Systems
- 405 Drainage and Irrigation Systems and Facilities

Outcome #2

1. Outcome Measures

Number of Subsurface Drainage Design and Water Management Workshop Participants

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	265

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Increases in precipitation and land and commodity prices along with new technologies have led to increased interest in subsurface (tile) drainage to address excess moisture concerns. Good drainage design requires an understanding of soils, topography, drainage system, legal, and environmental factors. Improper drainage design results in systems that provide less than desired benefits or greater than desired environmental impacts.

What has been done

A multistate Extension effort among South Dakota, North Dakota, Iowa and Minnesota, along with industry partners, conducted six workshops or forums for subsurface drainage design and water management. The workshops focused on meeting profitability and environmental objectives.

Results

Two-hundred and sixty-five participants gained knowledge in the areas of drainage design fundamentals, managed drainage design, soil principles, lift stations, design tools, agronomic considerations, and legal and wetlands issues. With this knowledge, it is assumed that producers will reduce crop loss due to excess water.

4. Associated Knowledge Areas

KA Code	Knowledge Area
405	Drainage and Irrigation Systems and Facilities

Outcome #3

1. Outcome Measures

Enhance Understanding of Bio-renewable Graphene Production

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Before supercapacitors can begin replacing batteries in tractors and powering electric cars, scientists must generate materials to fabricate electrodes for bigger supercapacitors. To manufacture these storage devices, the United States now imports most of its activated carbon from Asia.

What has been done

Through a process developed for a project aimed at producing activated carbon for water purification, biochar was successfully converted into graphene. Biochar is a charcoal like material obtained from pyrolysis of dried distillers grain solids (DDGS) and other plant materials that are abundant in South Dakota. Graphene can be used in place of expensive, activated carbon to coat the electrodes of energy storage devices - supercapacitors.

Results

Through the process developed in this project, the biochar has been successfully converted into graphene which can be used in place of expensive, activated graphene to coat the electrodes of energy storage devices - supercapacitors. Further progress for producing graphene has been achieved using a low temperature process, using significantly less energy and time. The bio-renewable graphene technique has the potential to benefit farmers and biofuel producers with additional income, and also to benefit our country's advanced carbon materials and advanced energy storage device industries.

4. Associated Knowledge Areas

KA Code	Knowledge Area
403	Waste Disposal, Recycling, and Reuse

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Competing Programmatic Challenges

Brief Explanation

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(I). Planned Program (Evaluation Studies)

Evaluation Results

Nothing to Report

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

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

Reporting on this Program

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 (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	2.8	0.0	25.3	0.0
Actual Paid	3.2	0.0	11.7	0.0
Actual Volunteer	0.1	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
79401	0	221972	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
79401	0	221972	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

2. Brief description of the target audience

- Native Americans
- Health Researchers
- Farmers
- Biofuels Industry
- Beef Science Community
- Beef Producers
- Food Businesses
- Consumers

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1299	197533	1225	1932

2. Number of Patent Applications Submitted (Standard Research Output)
Patent Applications Submitted

Year: 2015
 Actual: 7

Patents listed

1. Method and System for Improving Yogurt Texture during Yogurt Manufacture
 2. Production of Food Grade Distillers Dried Grains
 3. Process of Manufacturing Non-strained Formulated High-protein Acid Gels Without Graininess Defect and Improved Mouth-feel
 4. Application of a Food Grade Enzyme as Antimicrobial and Antispore Agent in Foods and Cleaning and Sanitation
 5. Process for Manufacture of Mineral Stabilized Milk Permeate Powders
 6. A Process for the Preparation of Heat Stable Whey Proteins
 7. Method and System for Improving Yogurt Texture During Yogurt Manufacture
- Method and System for Improving Yogurt Texture During Yogurt Manufacture

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	4	4

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Percentage of all Hatch Research Projects in Food and Non-Food Products: Development, Processing, Quality, and Delivery

Year Actual
 2015 7

Output #2

Output Measure

- Developed a Strong Research Program to Enhance the US Dairy and Food Industry
Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Extract and Analyze Oilseeds to Determine Biofuel Production Suitability

Year	Actual
2015	1

Output #4

Output Measure

- Number of BBQ Bootcamp Workshops

Year	Actual
2015	5

Output #5

Output Measure

- Number of Publications Posted on iGrow Website
Not reporting on this Output for this Annual Report

Output #6

Output Measure

- Number of Articles Posted on iGrow Website
Not reporting on this Output for this Annual Report

Output #7

Output Measure

- Number of Podcasts Posted on iGrow Website
Not reporting on this Output for this Annual Report

Output #8

Output Measure

- Number of Radio Programs Posted on iGrow Website
Not reporting on this Output for this Annual Report

Output #9

Output Measure

- Conduct Research to Utilize Milk Components in Dairy Products

Year	Actual
2015	1

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

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 Measures

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

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	7

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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 accomplished using less land, less water and less energy than is used today. Science driven technologies must be developed for this to be achieved in a sustainable manner.

What has been done

Within the College of Agricultural and Biological Sciences, there are seven Hatch projects that are categorized in the Planned Program of 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. Projects include but are not limited to 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.

Results

Upgrading bio-oils into hydrocarbon biofuels, the manufacture of modified milk protein concentrates to be used as ingredients in food products, improved health and nutrition benefits from dairy products, and the development of an oilseed based biofuel industry - biodiesel, bio-jet fuel, oil additives, and specialty lubricants that can help reduce our dependence on petroleum-based products. The biofuel industry also provides opportunities for agricultural diversification and rural sustainability in South Dakota. In addition, graduate students gain valuable knowledge and skills while collaborating on research projects.

4. Associated Knowledge Areas

KA Code	Knowledge Area
----------------	-----------------------

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

Outcome #2

1. Outcome Measures

Increase Knowledge of Structure-Function Relationships of Milk Proteins

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Increase Knowledge for Obtaining Maximum Oil Yields

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The global demand for energy threatens the economic stability of nearly every country in the world. The United States needs to develop a sustainable source of bioenergy and bio-based products. 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.

What has been done

SDSU has investigated oil extraction from sunflower, camelina, canola, flax, safflower, and carinata using two different approaches, cold press and solvent extraction. The oils produced were characterized for heating value, density, viscosity, pH value, chemical composition (fatty acid profile), elemental composition, etc. The goal is to evaluate and compare the technical and economic feasibility of solvent extraction and cold press for efficiently extracting oils from various oilseeds for further conversion into bio jet fuels.

Results

A novel catalytic cracking process for converting inedible oils (non-food oilseeds, animal fats, waste oils, etc.) to hydrocarbon based advanced biofuels was carried out. Sunflower, camelina, and canola oils have been successfully upgraded to hydrocarbon fuels. The results have been presented to national and international conferences.

4. Associated Knowledge Areas

KA Code	Knowledge Area
511	New and Improved Non-Food Products and Processes

Outcome #4

1. Outcome Measures

Number of BBQ Bootcamp Participants

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	200

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In recent years, there has been a lot of negative information surrounding meat products. Many times this information is incorrect and misleading, leaving the consumer grasping for answers. Consumers have expressed the need for trusted science-based information to base their decisions upon.

What has been done

SDSU Extension, partnering with the South Dakota Beef Industry Council and South Dakota Pork Producer's Council conducted five workshops in five cities. The workshops provided intensive, hands-on opportunities for consumers to enhance their understanding of meat cookery, barbecuing, smoking, food safety, meat selection, and nutrition.

Results

Participant evaluations indicate the workshops were very successful in educating consumers. The BBQ Bootcamp program greatly enhanced the understanding of cookery, selection, and safe handling of meat cuts.

4. Associated Knowledge Areas

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

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Competing Programmatic Challenges

Brief Explanation

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(I). Planned Program (Evaluation Studies)

Evaluation Results

State Defined Outcome #4

Survey:

BBQ Bootcamp

200 participants 47 respondents

Presentation

1 = not valuable; 10 = highly valuable

8.4 - Meat Selection and Retail Cuts

8.8 - Grilling, Smoking, Barbequing, Retail Selection

8.3 - Food Safety & Degrees of Doneness

8.7 - Spices, Rubs, & Marinades

Question

1 = absolutely not, 10 = absolutely; 1 = no knowledge, 10 = expert knowledge

9.2 - Did the speaker effectively explain the information?

6.5 - Knowledge level before program

8.1 - Knowledge level after program

9.7 - Was the program beneficial?

9.1 - Was the program beneficial in helping understand food safety, handling, and proper cooking temperatures for meat?

Key Items of Evaluation

BBQ Bootcamp

Participant evaluations indicate the workshops were very successful in educating

consumers, especially in the areas of food safety, handling, and proper cooking temperatures for meat.

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Economics, Markets, and Policy

Reporting on this Program

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	35%		3%	
602	Business Management, Finance, and Taxation	40%		21%	
603	Market Economics	25%		14%	
604	Marketing and Distribution Practices	0%		25%	
605	Natural Resource and Environmental Economics	0%		12%	
607	Consumer Economics	0%		11%	
609	Economic Theory and Methods	0%		3%	
610	Domestic Policy Analysis	0%		11%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	6.5	0.0	12.3	0.0
Actual Paid	7.6	0.0	15.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
185268	0	285393	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
185268	0	285393	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Conduct Research on Rural Sustainability
- Analyze Farm Real Estate Market Developments
- Analyze Agricultural Commodity Prices
- Research Trends and Financial Risks
- Develop Marketing Strategy Recommendations
- Partner with the South Dakota Soybean Research and Promotion Council

2. Brief description of the target audience

- Rural Economic Development Professionals
- Entrepreneurs
- Agricultural Commodity Groups
- Policy Makers
- Environmental Groups
- Farmers, Ranchers
- Producers
- Ag Land Owners
- Women in Agriculture
- Youth
- Agricultural Leaders

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	10282	188649	993	438

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2015

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	11	10	21

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Percentage of all Hatch Research Projects in Economics, Markets, and Policy

Year	Actual
2015	9

Output #2

Output Measure

- Conduct Studies to Identify Product Attributes and Willingness to Pay for Locally Produced Beef
Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Number of Ag CEO Workshops
Not reporting on this Output for this Annual Report

Output #4

Output Measure

- Number of Publications Posted on iGrow Website
Not reporting on this Output for this Annual Report

Output #5

Output Measure

- Number of Articles Posted on iGrow Website
Not reporting on this Output for this Annual Report

Output #6

Output Measure

- Number of Podcasts Posted on iGrow Website
Not reporting on this Output for this Annual Report

Output #7

Output Measure

- Number of Radio Programs Posted on iGrow Website
Not reporting on this Output for this Annual Report

Output #8

Output Measure

- Conduct Research to Enhance Rural Sustainability and Quality of Life

Year	Actual
2015	0

Output #9

Output Measure

- Conduct Farm Bill Training

Year	Actual
2015	1

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of Economics, Markets, and Policy Hatch Research Projects
2	Increased Understanding of Consumer Willingness to Pay for Locally Produced Beef
3	Number of New Participants in the Ag CEO Program
4	Enhance Sustainability and Quality of Life in Rural South Dakota

Outcome #1

1. Outcome Measures

Number of Economics, Markets, and Policy Hatch Research Projects

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	9

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The economy is always changing and as 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.

What has been done

Within the College of Agricultural and Biological Sciences, there are nine Hatch projects that are categorized in the Planned Program of 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 enhancing rural sustainability and quality of life, research involving agricultural commodity prices, energy and the environment, agricultural land market trends, and the economic impacts on wildlife and crop production from biofuel production.

Results

Through research, our Department of Economics continues to build a scientific knowledge base to improve agricultural marketing and trade, farm and ranch management, and agricultural policies. Examples include:

Gender-based information for entrepreneurs in rural South Dakota, market studies for South Dakota produced beef, agricultural and international trade policy issues in the Northern Great Plains, commodity characteristic values of Hard Red Spring Wheat and vegetable oils, land markets and land management in South Dakota, and opportunities for cellulose based ethanol production in South Dakota. In addition, graduate students gain valuable knowledge and skills while collaborating on research projects.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Increased Understanding of Consumer Willingness to Pay for Locally Produced Beef

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Number of New Participants in the Ag CEO Program

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Enhance Sustainability and Quality of Life in Rural South Dakota

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Rural Americans face many unique challenges in terms of socioeconomic well-being. The number of rural women entrepreneurs is increasing, but relatively little is known if their needs are different than rural male entrepreneurs. Identifying those needs will help with the development of resources to assist rural entrepreneurs.

What has been done

A survey was conducted to determine if male and female rural South Dakotan's have similar or different entrepreneurial needs and characteristics. The survey examined demographic characteristics - type of industry, start-up capital, use of social media, entrepreneurial self-efficacy, and needs and challenges. Several case studies were also completed that relate to rural sustainability and agri-business.

Results

The comparative study of male and female entrepreneurs in rural South Dakota reveals new gender-based information that can be used to support and address the needs of rural entrepreneurs in the state. The case study results will assist business owners and entrepreneurs with development and marketing, rural-urban interface, and potential liability issues. The information gained from the research will also be incorporated into classrooms of higher education. The information has been made available to support agencies for use in the development of training programs.

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Competing Programmatic Challenges
- Other (Weather in general)

Brief Explanation

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

The effects of the drought of 2012 ripple through several years of farm records, confounding analysis.

Not a catastrophe, but the weather can change the course of things, one specialist had planned a meeting for 25 people, but 175 showed up because it rained and they couldn't hay.

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(I). Planned Program (Evaluation Studies)

Evaluation Results

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

Survey:

Dairy Farm Bill Training - Margin Protection Program

69% - Percent of SD dairy producers enrolled in the MPP Dairy program through USDA

91 participants attended the Farm Bill Training

78 survey respondents of which 46 were dairy producers

2.33 average overall knowledge of the MPP-Dairy program before the meeting

3.89 average after the meetings

100% participants were either satisfied very satisfied overall quality of the workshop

All participants thought the information was easy to understand

70% of dairy producers in attendance indicated they would sign up for MPP-Dairy

18% will defer the participation decision to a later year, and the rest are still undecided

Key Items of Evaluation

Survey results indicate that Farm Bill training is a good candidate for future SDSU Extension collaboration.

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

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

Reporting on this Program

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 (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	12.0	0.0	4.5	0.0
Actual Paid	11.9	0.0	11.7	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
291136	0	221972	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
291136	0	221972	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- 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. Brief description of the target audience

- Asian and African Refugees
- Women with Military Connections
- Nutrition and Food scientists
- Health Educators
- Athletes
- Food Entrepreneurs
- Consumers of Food Products
- Local Schools
- Youth
- Senior Citizens

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	3918	625206	2719	24597

2. Number of Patent Applications Submitted (Standard Research Output)
Patent Applications Submitted

Year: 2015
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	6	3	9

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Percentage of all Hatch Research Projects in Human Nutrition, Food Safety, and Human Health and Well-Being

Year	Actual
2015	7

Output #2

Output Measure

- Number of Food Processing and Food Marketing Events

Year	Actual
2015	22

Output #3

Output Measure

- Number of Gerontology Events Presented

Year	Actual
2015	33

Output #4

Output Measure

- Increase Preferences for Fruits, Vegetables, Low-fat Dairy Products and Physical Activity
Not reporting on this Output for this Annual Report

Output #5

Output Measure

- Number of Smart Choices Grocery Store Locations
Not reporting on this Output for this Annual Report

Output #6

Output Measure

- Number of Healthy Living Events that Created Learning Opportunities

Year	Actual
2015	25

Output #7

Output Measure

- Number of Food Safety Certification or Recertification Courses Presented
Not reporting on this Output for this Annual Report

Output #8

Output Measure

- Number of Publications Posted on iGrow Website
Not reporting on this Output for this Annual Report

Output #9

Output Measure

- Number of Articles Posted on iGrow Website
Not reporting on this Output for this Annual Report

Output #10

Output Measure

- Number of Podcasts Posted on iGrow Website
Not reporting on this Output for this Annual Report

Output #11

Output Measure

- Number of Radio Programs Posted on iGrow Website

Not reporting on this Output for this Annual Report

Output #12

Output Measure

- Number of Garden Development or Enhancement Workshops and Webinars Conducted

Year	Actual
2015	7

Output #13

Output Measure

- Increase Quality of Life for Refugees in South Dakota

Year	Actual
2015	0

Output #14

Output Measure

- Conduct Research on the Role of Vitamin D, Calcium and Bioactive Food Components

Year	Actual
2015	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

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 Youth Participating in Tatanka's Healthy Tales Intervention Program
5	Number of Smart Choices Grocery Store Participants
6	Number of Participants Involved in Healthy Living Learning Opportunities
7	Number of Participants that Completed Food Safety Certification or Recertification Food Safety Courses
8	Number of Community or School Gardens Receiving Assistance with Development or Enhancement
9	Number of New Roots for New Americans Program Participants
10	Prevent Obesity and Obesity Related Disorders

Outcome #1

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	8

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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. Obesity research in rural populations is lacking. To improve individual's health, scientific discoveries need to be found and translated to practice.

What has been done

Within the College of Agricultural and Biological Sciences, there are eight Hatch projects that are categorized in the Planned Program of Human Nutrition, Food Safety, and Human Health and Well-Being. Research in this program is 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.

Results

Through research, we continue to build a scientific knowledge base to understand and improve nutritional sciences.

Examples include:

Understanding and preventing the underlying mechanisms of chronic diseases, dietary and physical activity behaviors of rural populations, behaviors that support healthful lifestyles in young adults, and determining the impact of dietary components. In addition, graduate students gain valuable knowledge and skills while collaborating on research projects.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Number of Food Processing and Food Marketing Participants

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	296

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Millions of Americans become ill each year from foodborne diseases. With an increase in home processed foods that are consumed by the processor or sold at local markets, there is the potential for an increase in foodborne illnesses. It is imperative that proper equipment, methods and laws are followed to prevent unnecessary illnesses and deaths from home processed foods.

What has been done

SDSU Extension participated in lectures, workshops, conferences, online classes, and consultations throughout South Dakota to educate home food processors and entrepreneurs that want to sell home processed foods. The workshops were presented using the USDA Guidelines for Safe Home Food Processing. Social media, printed fact sheets and SDSU Extension's online teaching platform, iGrow were also used to disseminate food safety information.

Results

Participants of SDSU Extension's food processing and food marketing programs increased their knowledge and gained confidence that they are practicing safe food guidelines and regulations. This gives consumers more control over the foods they eat and it adds value and profitability to

the growers that choose to sell their foods at local markets. In addition to this, with the Food Preservation Mentor program, SDSU Extension is able to expand its reach through the citizens of South Dakota. The more people that increase their knowledge of safe food processing, the more likely that food-borne illnesses will be reduced in South Dakota.

4. Associated Knowledge Areas

KA Code	Knowledge Area
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #3

1. Outcome Measures

Increase Knowledge of Aging Issues to Participants

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

A combination of low birth rates and increased longevity is driving the aging of our population. As the average age of the population increases, the number of individuals with disabilities is also projected to increase. Senior citizens and their families need access to educational information to help them live active and healthy lives in their homes and communities. Access to information can be especially limited in rural areas.

What has been done

In collaboration with SDSU Counseling and Human Development, SDSU Extension conducts educational events for its aging citizens in rural and urban South Dakota. This is accomplished through presentations, training classes, public television, video, webinars, and the SDSU Extension website - iGrow. Partnerships, learning communities, and train-the-trainer models are crucial to meeting the needs of the elderly in South Dakota.

Results

As a result of SDSU Extension's outreach efforts, senior citizens in South Dakota have more knowledge to help them maintain and improve their overall health and increase their opportunities

for independent living. Participants have increased their knowledge in many areas, including: aging in place, disability awareness, challenges of rural life, Medicare, disease prevention, Alzheimer's Disease, and strategies to keeping healthy brains.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle

Outcome #4

1. Outcome Measures

Number of Youth Participating in Tatanka's Healthy Tales Intervention Program

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Number of Smart Choices Grocery Store Participants

Not Reporting on this Outcome Measure

Outcome #6

1. Outcome Measures

Number of Participants Involved in Healthy Living Learning Opportunities

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	274

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Obesity, poor nutritional habits, low levels of physical activity, and chronic diseases adversely affect the quality of life in South Dakota. The problem is not limited to adults; children in South Dakota have higher than average risks for obesity and diabetes. Risk behaviors for all ages need to be modified to prevent or greatly reduce the risk for developing health related problems and diseases.

What has been done

Through partnerships, SDSU Extension is involved in many programs that help create healthy living environments. Military Women's Wellness addresses specific needs of females with a connection to the armed services. Worksite Wellness targets the health and well-being of the South Dakota workplace. Better Choices, Better Health-SD addresses the impact of chronic diseases. The Burke Wellness Coalition addresses community health and wellness. iGrow Readers and the Bountiful Backpack teach children about healthy eating and physical activity, and Eat Smart, Play Hard - The Oyate Way delivers nutritional education to Native American children.

Results

By working with many organizations, including healthcare providers, health professionals, advisory groups, and the South Dakota Department of Health, SDSU Extension impacts thousands of individuals. Women with military connections received support for physical, emotional, spiritual, intellectual, occupational, and social wellness. Businesses across the state are using the training they receive to adopt workplace strategies for health and physical activity. South Dakotans with chronic health conditions are learning that they can live and thrive again with training in chronic disease self-management. Community members are improving their health through walking programs and physical activities. With repeated exposure and educational reminders, our youth are improving their abilities to make good choices about diet and exercise.

4. Associated Knowledge Areas

KA Code	Knowledge Area
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
724	Healthy Lifestyle

Outcome #7

1. Outcome Measures

Number of Participants that Completed Food Safety Certification or Recertification Food Safety Courses

Not Reporting on this Outcome Measure

Outcome #8

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	76

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

As rural America keeps shrinking, there is a greater disconnect between our citizens and agriculture. At the same time, more people are in need of affordable, safe, and healthy foods. Research indicates that community gardeners, as well as youth that participate in gardening programs, include more fruits and vegetables in their diet.

What has been done

In response to educational requests, SDSU Extension has conducted workshops and activities involving horticulture, S.T.E.M, curriculum, food safety, nutrition in Chamberlain, Waubay and Sioux Falls. The Black Hills Garden Education Network continued into its second season, connecting 48 garden educators, volunteers and organizations from nine communities in the region. SDSU Extension also coordinated funding and donations to providing grants to 41 teaching garden projects across the state.

Results

Eighty-two community or school gardens have been launched, enhanced, or are in the development stage. The participants involved have learned valuable organization, development and horticulture skills that make them more self-reliant with their food production and consumption choices. Participants expressed confidence in themselves to launch and improving projects in their communities, providing more opportunities for food production and exposure to the amazing world of agriculture.

4. Associated Knowledge Areas

KA Code	Knowledge Area
704	Nutrition and Hunger in the Population

Outcome #9

1. Outcome Measures

Number of New Roots for New Americans Program Participants

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	39

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Many of the refugees that have come to live in Sioux Falls, SD have an interest in growing their own food and to turn production into an income source. Barriers for this group include language, income levels, access to fresh fruits and vegetables, transportation, and land access. There is a need to help refugees gain knowledge of production in South Dakota as well as to assist with launching community gardens and farmers markets.

What has been done

In 2013 the Somali Bantu Community Development Councils of South Dakota acquired a grant to assist aspiring refugees to develop their skills as growers, to sell their produce, and to encourage healthy diets. The funding helped to establish a community garden and allowed them to partner with New Roots for New Americans, an intensive urban farming program developed by SDSU Extension. Now called the Center for Immigrants & Refugees Families, the partnership continues with SDSU Extension. Training programs were conducted for beginner level courses and intermediate courses.

Results

Thirty-nine refugee participants from Asia and Africa gained knowledge of sustainable produce production. The gain in knowledge includes food safety, nutritional vegetable preparation, food preservation, local food entrepreneurship, and marketing. In this reporting period, a second 50+ hour training program was designed and a Master Gardener was re-hired to provide horticultural training. Also, a second community garden at a new location was developed. The New American Garden Market opened for its second year with nine vendor participants. This ultimately helps increase opportunity, income and access to healthy produce. And it creates community among refugees as well as with the mainstream culture.

4. Associated Knowledge Areas

KA Code **Knowledge Area**
704 Nutrition and Hunger in the Population

Outcome #10

1. Outcome Measures

Prevent Obesity and Obesity Related Disorders

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

There is a shortage of long-term strategies for the prevention of obesity, especially in nutrition intervention. The role of vitamin D, calcium and bioactive food components may play a big role in preventing obesity. Studies show that low vitamin D status and low calcium intake have been linked to an increased risk of obesity, while increased consumption of bioactive food components may contribute to a healthy body weight.

What has been done

Research was performed to determine the role and mechanisms of vitamin D in prevention of the bone and metabolic syndrome related disorders using a mouse model of diet-induced obesity/pre-type 2 diabetes. The results have been published in nine peer reviewed articles and presented as symposium talks at meetings.

Results

A nutritional approach for the prevention of obesity and obesity related disorders was developed. This was based on decreasing the number of fat cells (adipocytes) in adipose tissue with the natural form of cell death, apoptosis, with vitamin D and bioactive food components. It was demonstrated that the removal of fat cells with this approach helps to maintain a healthy body weight and improve the metabolic and hormonal dysregulation associated with obesity. The findings imply that this approach for prevention of obesity and obesity related bone and metabolic disorders should include increased intake of vitamin D.

4. Associated Knowledge Areas

KA Code **Knowledge Area**
702 Requirements and Function of Nutrients and Other Food Components

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Competing Public priorities
- Competing Programmatic Challenges
- Other (Personnel changes)

Brief Explanation

Unexpected turnover in worksite participants.

Conflicting community activities have caused unexpected low attendance at meetings.

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(I). Planned Program (Evaluation Studies)

Evaluation Results

Nothing to Report

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Families, Youth and Communities

Reporting on this Program

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 (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	37.0	0.0	0.9	0.0
Actual Paid	42.1	0.0	1.7	0.0
Actual Volunteer	6.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
1032210	0	31710	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1032210	0	31710	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Promote Boom/Bust Energy Development Activities
- Conduct Sustainability Conferences
- Develop Community Engagement Processes
- Conduct Research of Financial Behavior in Rural America
- Promote Small Business Activities in Rural Areas
- Conduct Financial Wellness Programs
- Conduct Workshops on Indian Reservations in Western South Dakota
- Conduct Estate and Transition Planning Workshops
- Conduct Character Education Program Training

2. Brief description of the target audience

- Women in Agriculture
- Native Americans
- Community Leaders
- Government Officials
- Financial Education Professionals
- Rural Communities
- Entrepreneurs
- Youth
- Families

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	13805	951489	31883	53121

2. Number of Patent Applications Submitted (Standard Research Output)
Patent Applications Submitted

Year: 2015
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	5	4	9

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Percentage of all Hatch Research Projects in Families, Youth and Communities

Year	Actual
2015	1

Output #2

Output Measure

- Number of Communities Participating in the Book Reads and Discussions
 Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Number of Communities Hosting Small Business Beginnings Workshops
 Not reporting on this Output for this Annual Report

Output #4

Output Measure

- Number of Teens Trained in the Teens as Teachers Program
Not reporting on this Output for this Annual Report

Output #5

Output Measure

- Number of High School Students Selected as 4-H Hometown Hero Representatives
Not reporting on this Output for this Annual Report

Output #6

Output Measure

- Implemented Evidence-Based Programs for Children, Youth and Families at Risk (CYFAR)
Not reporting on this Output for this Annual Report

Output #7

Output Measure

- Number of Communities Hosting the Ripple Effect Mapping
Not reporting on this Output for this Annual Report

Output #8

Output Measure

- Increase Intergenerational Engagement with Community Organizations
Not reporting on this Output for this Annual Report

Output #9

Output Measure

- Number of Events Conducted on Native American Reservations

Year	Actual
2015	25

Output #10

Output Measure

- Number of Garden Development or Enhancement Workshops and Webinars Conducted
Not reporting on this Output for this Annual Report

Output #11

Output Measure

- Number of Publications Posted on iGrow Website
Not reporting on this Output for this Annual Report

Output #12

Output Measure

- Number of Articles Posted on iGrow Website
Not reporting on this Output for this Annual Report

Output #13

Output Measure

- Number of Podcasts Posted on iGrow Website
Not reporting on this Output for this Annual Report

Output #14

Output Measure

- Number of Radio Programs Posted on iGrow Website
Not reporting on this Output for this Annual Report

Output #15

Output Measure

- Conduct Activities that Build Community Capacity

Year	Actual
2015	0

Output #16

Output Measure

- Create Financial Literacy Learning Opportunities

Year	Actual
2015	17

Output #17

Output Measure

- Conduct Character Education Programs and Activities

Year	Actual
2015	2

Output #18

Output Measure

- Create Learning Opportunities for Youth

Year	Actual
-------------	---------------

2015

21

Output #19

Output Measure

- Create Resource Management Learning Opportunities

Year

Actual

2015

9

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of Families, Youth and Communities Hatch Research Projects
2	Number of Participants in the Book Reads and Discussions
3	Number of Small Business Beginnings Workshop Participants
4	Number of Students Taught by Teens as Teachers
5	Number of Elementary Students Impacted by 4-H Hometown Hero Representatives
6	Number of Children, Youth and Families at Risk (CYFAR) Participants
7	Ripple Effect Mapping Participants
8	Number of Youth Voices Program Participants
9	Number of Participants Involved in Native American Reservation Events
10	Number of Community or School Gardens Receiving Assistance with Development or Enhancement
11	Enhance Rural Community Sustainability in South Dakota
12	Increase Family and Personal Financial Literacy to Participants
13	Build Good Character in South Dakota's Youth
14	Develop Life Skills for Youth
15	Increase Individual and Family Quality of Life

Outcome #1

1. Outcome Measures

Number of Families, Youth and Communities Hatch Research Projects

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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.

What has been done

Within the College of Agricultural and Biological Sciences, there is one Hatch project that is categorized in the Planned Program of Families, Youth and Communities. The research activity in this program is 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.

Results

Through research, we continue to build a scientific knowledge base to improve and understand the sociological factors associated with personal finance. The results of a study that examined the link between behavioral life-cycle constructs and financial risk tolerance suggest that low-to-moderate households can benefit from financial education and commitment strategies. Data collected from a 2014 survey generated five research projects. Two articles on financial decision making were published.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management

Outcome #2

1. Outcome Measures

Number of Participants in the Book Reads and Discussions

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Number of Small Business Beginnings Workshop Participants

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Number of Students Taught by Teens as Teachers

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

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

Not Reporting on this Outcome Measure

Outcome #6

1. Outcome Measures

Number of Children, Youth and Families at Risk (CYFAR) Participants

Not Reporting on this Outcome Measure

Outcome #7

1. Outcome Measures

Ripple Effect Mapping Participants

Not Reporting on this Outcome Measure

Outcome #8

1. Outcome Measures

Number of Youth Voices Program Participants

Not Reporting on this Outcome Measure

Outcome #9

1. Outcome Measures

Number of Participants Involved in Native American Reservation Events

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1293

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

There are many agriculture related issues that need to be addressed on South Dakota's reservations. Access to nutritious food is limited. The knowledge of traditional foods is getting lost. Many tribal land owners own fractionated allotments of land and lack the knowledge of how to lease the land or obtain funding. The rangelands are sometimes overgrazed or the plants are exposed to pesticide overspray. There is a huge interest for agriculture programs on the reservations.

What has been done

Through its partnerships, SDSU Extension has Federally Recognized Tribal Extension Program offices at Cheyenne River, Pine Ridge and Rosebud Reservations. Nutrition Assistants, 4-H Program Advisors, and Field Specialists all provide leadership and outreach activities to the Native American communities. In collaboration with its partners, SDSU Extension conducted horticulture and livestock programs, gardening workshops, food preparation and preservation classes, and workshops that focus on wild and native foods and herbs.

Results

All ages of Native Americans on South Dakota's reservations gained knowledge in many areas, from nutritional information of chokecherry and prairie turnip to how to extend the growing season using high tunnels. School and community gardens continue to be established and expand - nine new gardens were started on Cheyenne River Reservation. Nearly 500 people on Rosebud Reservation and Pine Ridge Reservation participated in Beginner Gardener training; learning about raised bed and terrace gardening, drip irrigation, and healthy food choices. On Rosebud Reservation, participants learned about safe food handling, including canning fruits and vegetables and drying buffalo. With SDSU Extension staff, gatherers cultivated traditional wild plants and herbs and identified locations where these plants can be re-established in the wild. Events were hosted that identified plants such as wild plum, wild mustard, and sage that can be used as a food source or as medicine. Six participants in the Commercial Horticulture program and nine participants in the Livestock Production program completed their first year of training. All 15 participants are working to develop or finalize business plans, which can add directly to the economic and community development on reservations. Through participation of these events and activities, the tribal members become empowered and increase the likelihood that they will be successful food producers. And by engaging youth and communities, the native culture is being revitalized.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures
806	Youth Development

Outcome #10

1. Outcome Measures

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

Not Reporting on this Outcome Measure

Outcome #11

1. Outcome Measures

Enhance Rural Community Sustainability in South Dakota

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Rural communities often lack the resources to address important issues. By helping to build community capacity and equipping them with the tools they need, rural communities can increase their chance of sustainability.

What has been done

SDSU Extension's Community Development team works directly with many rural communities on one-time projects or with helping to build community capacity so they can continue programs themselves. The activities conducted involve writing successful grant proposals, helping communities create a vision for growth, dealing with boom or bust energy development, small business conferences, and expanding the business of locally grown foods.

Results

Many rural communities rely heavily on grant funding to support projects, but they often do not have the resources to hire professional writers. More than 50 participants from 20 communities attended the Writing Your Future conference, a grant writing workshop to train participants to write their own proposals. Marketing Hometown American trains community facilitators to conduct study circles which lead to community marketing plans. The marketing plans help attract new residents to their areas. In western South Dakota, there are three major oil and gas formations that could impact several rural communities. A Boom or Bust conference was held to educate community leaders and the citizens on the positive and negative impacts of energy development. Small Business is Everybody's Business, a six-city video teleconference connected rural communities with nationally-known speakers to share entrepreneurship growth strategies. An environment that supports entrepreneurship is essential for community growth. Dakota Fresh, a producer-owned food hub in South Dakota gives producers a new approach to marketing local foods. Through the newly formed food hub, farmers and growers are able to expand their markets and help the local economy grow.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being

Outcome #12

1. Outcome Measures

Increase Family and Personal Financial Literacy to Participants

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	214

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Saving money continues to be a struggle for most Americans. Without personal or family budgets, citizens in South Dakota are very vulnerable to economic strain. Emergencies, high interest credit, and unhealthy spending all lead to the risk of poverty, which increases the burden of health and welfare for local, county, and state governments.

What has been done

In partnership with the SDSU Department of Consumer Sciences, SDSU Extension promotes financial literacy through its family and personal finance programs. Growing Financial Wellness is a webinar based program developed to increase personal finance knowledge. Jump\$tart Teacher Training - delivered online - is a learner-centric approach to give teachers knowledge so they in-return, can effectively teach their students about personal finance. The Student Loan Repayment program was conducted to provide student loan information to upper classmen on the SDSU campus.

Results

With its family and personal finance programs, SDSU Extension reached more than 214 individuals with 17 events. Not only do the participants have a better chance for increased financial capability and capacity, but the public benefits through less reliance on public assistance programs. It is also reasonable to assume that with improved financial capability of the citizens, employers in South Dakota will see an increase in work productivity, less work accidents, and healthier employees.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management

Outcome #13

1. Outcome Measures

Build Good Character in South Dakota's Youth

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	912

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

With 82% of parents in South Dakota working, children are less supervised and parents often lack the tools 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.

What has been done

SDSU Extension 4-H provided South Dakota youth in 4th, 7th and 9th grades the opportunity to learn about maxims and how they apply to their lives. The Quotes to Live By Essay Contest promotes reading, reflection, critical thinking and composition skills as youth write about the importance of having good character and making good decisions.

Results

Through the Quotes to Live By Essay Contest, students are making better decisions and becoming better people of character. The teachers reported positive outcomes of the essays through the following quotes about their students.

- ... made my students genuinely reflect on what's important in life ...
- ... wrote about issues that they deal with at these sometimes challenging times of their lives ...
- ... they were able to see their situations in a more positive and manageable way ...
- ... it leaves thoughts of being better people every day ...
- ... they have grown into confident individuals who are not afraid to express ...
- ... they have been able to realize that they are important, they have many things to say ...
- ... as she wrote about it, she gained important insight into herself ...
- ... it provided them a way to express how important having character is ...

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #14

1. Outcome Measures

Develop Life Skills for Youth

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	567

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Many of today's youth are exposed to negative role models and high risk behaviors. When youth learn and practice life skills, build resilience. Students with higher levels of resiliency show a decrease in risky behaviors.

What has been done

SDSU Extension conducts many programs aimed at youth, both through 4-H and non 4-H programs. In collaboration with South Dakota 4-H and the Child and Youth program at the South Dakota National Guard, camp sessions were conducted to support military youth. Through the Dairy Cattle Evaluation and Judging program, youth participate in judging schools throughout South Dakota. SDSU Extension/SD 4-H developed a training curriculum to train staff and volunteers STEM skills through the 4-H Robotics program. The program addresses the growing need of robotics volunteers.

Results

South Dakota youth gained valuable life skills, including team work, following directions, community service, decision making, public speaking, resilience building, and increased independence. As youth gain confidence in themselves, they also take more responsibility for their personal actions. Science, technology, engineering, and math (STEM) also teach our youth important life skills. STEM literacy allows youth to be innovative and creative, make informed decisions, and stay current in a forever changing society.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #15

1. Outcome Measures

Increase Individual and Family Quality of Life

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	465

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The prosperity of farm and ranch families is critical to the sustainability of rural South Dakota. Whether it is young producers, women in agriculture, or the older generation of farmers and ranchers - they all need business and management resources to help keep their operations thriving.

What has been done

Three video teleconference sessions of Sustaining the Legacy were conducted at four SDSU Extension Regional Centers. Topics included wills, trusts, insurance, business structures, and estate planning. The national program Annie's Project, which provides a learning environment for women in agriculture, was held in four South Dakota communities. The workshops focused on risk management and production risk. Additionally, a symposium was held at SDSU to help students prepare for the return to their family operations.

Results

The individuals and families that participated in the SDSU Extension programs all have a better understanding of the business side of running an operation. The participants now have new resources and industry professionals to help answer questions. They are creating business goals, financial analysis, and marketing plans. They are now more aware of the legal issues concerning retirement and passing the operation on to the next generation. And they better understand that communication is a necessity to building a family/business relationship. Importantly, the farmers and ranchers gained knowledge that is vital to the continuance of multi-generational farming and ranching, which is essential to the sustainability of rural South Dakota.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

In several counties, efforts have been made to increase minority 4-H enrollment, but success has been limited. An after-school program and the YMCA have been the most effective places to reach minority audiences in one of the communities.

A youth pilot program underway had to start over and restructure when the entire board of the non-profit was replaced.

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(I). Planned Program (Evaluation Studies)

Evaluation Results

State Defined Outcome # 6

Survey

Writing Your Future Grant Writing Conference

28 of 50 Participants Responding

Grant Writing Basics

54% Very informative

46% Some new learning

Support Your Grant Application with Evidence

68% Very informative

32% Some new learning

Creating a Legacy of Giving

36% Very informative

61% Some new learning

Finding Grant Writing Assistance

82% Very informative

18% Some new learning

Lunch Topics (Relationships and Leveraging in Grant Seeking)

18% Very informative
46% Some new learning

Panel Discussion of Funders

57% Very informative
36% Some new learning

State Defined Outcome # 7

Survey:

Growing Financial Wellness

191 participants

Evaluations were conducted using a retrospective pre-post survey (5-point Likert Scale: 1=Know Nothing to 5=Know a Lot).

Knowledge prior to all sessions average was 3.82 and increased to 4.81 after.

A 3-month follow-up evaluation was conducted to determine if any positive financial behavior had been adopted due to participation in the program.

- 50% obtained a copy of their credit report
- 78% obtained their credit score
- 40% created a debt management plan
- 50% spoke to their children about money
- 25% determined changes in the way they paid for college
- 78% implemented at least one money saving strategy in their home
- 75% identified at least one strategy to stretch their money
- 23% used a financial app or website to help manage money
- 40% identified steps needed to protect their estate
- 20% determined steps needed for health insurance during retirement years

State Defined Outcome # 7

Survey:

Student Loan Repayment Education

15 participants

100% of participants found the information in the face-to-face workshop useful.

100% of participants would recommend the workshop to other students.

Evaluations were conducted using a retrospective pre-post survey

(5-point Likert Scale: 1=Know Nothing to 5=Know a Lot). Selected results (mean before/after):

- Determine the amount of student loans owed (2.07/4.07)
- The difference between loan repayment plans (1.71/3.93)
- Options if having trouble making payments (1.86/4.14)
- Situations when loans can be forgiven, canceled, or discharged (1.57/4.21)

Participants who attended one-on-one sessions were able to:

Choose a repayment plan that best fit their financial situation; consolidate federal student loans; lower monthly payments; be removed from default status; and/or determine amount owed on federal and private student loans

State Defined Outcome # 9

Survey:

Developing Life Skills

215 parents of military youth

Parents of the 9-11 year old age group reported:

68% showed an increase in taking responsibility for personal actions

73% improved in making good decisions

84% exhibited a more positive attitude toward change

73% were more willing to share ideas

63% had improved in following directions

Parents of the 12-14 year old age group reported:

28% showed an increase in taking responsibility for personal actions

38% improved in making good decisions

50% showed increased independence

64% displayed more confidence in their actions

28% improved in following directions

Key Items of Evaluation

Surveys conducted for this planned program indicate positive experiences in knowledge gain and in participant satisfaction. Stakeholder input also provided feedback to the strengths and weaknesses of the programs.

VI. National Outcomes and Indicators

1. NIFA Selected Outcomes and Indicators

Childhood Obesity (Outcome 1, Indicator 1.c)	
0	Number of children and youth who reported eating more of healthy foods.
Climate Change (Outcome 1, Indicator 4)	
0	Number of new crop varieties, animal breeds, and genotypes with climate adaptive traits.
Global Food Security and Hunger (Outcome 1, Indicator 4.a)	
0	Number of participants adopting best practices and technologies resulting in increased yield, reduced inputs, increased efficiency, increased economic return, and/or conservation of resources.
Global Food Security and Hunger (Outcome 2, Indicator 1)	
0	Number of new or improved innovations developed for food enterprises.
Food Safety (Outcome 1, Indicator 1)	
0	Number of viable technologies developed or modified for the detection and
Sustainable Energy (Outcome 3, Indicator 2)	
0	Number of farmers who adopted a dedicated bioenergy crop
Sustainable Energy (Outcome 3, Indicator 4)	
0	Tons of feedstocks delivered.