PLAN OF WORK

Annual Report

SOUTH DAKOTA STATE UNIVERSITY
Federal Fiscal Year 2003
October 1, 2002 - September 30, 2003

Introduction

The South Dakota State University (SDSU) College of Agriculture and Biological Sciences (ABS) is comprised of the South Dakota Agricultural Experiment Station (AES), South Dakota Cooperative Extension Service (CES), and AgBio Academic Programs (AP). The SDSU College of Family and Consumer Sciences (FCS) is actively involved in programs conducted with AES and CES. This institution serves South Dakota and the Northern Great Plains, and through cooperative arrangements conducts programs that impact the nation and world.

The population of South Dakota is ranked 46th in the nation, with just over 754,000 people (2000 Census). More than one-third of the population can be found in the ten largest counties, which represent the most active growth in population, income and economic development. Minnehaha County alone has 20 percent of the state's population. The remaining 56 counties have substantially lower levels of population growth, if any, and pervasive levels of poverty. Poverty is particularly high on the native American reservations that exist in the state.

Historically, between 12 and 16 percent of South Dakota's population ranks below the poverty level, but in 1999, the figure was reduced to 9.3 percent. The 1999 U.S. Census Estimate indicated that South Dakota ranked 50th in average annual income, which in 1998 was $ 23,715. Statewide unemployment is consistently at or below three percent. This indicates that most citizens are employed, but do not have high paying jobs. One result is that most families have two wage earners, in some cases holding more than one job. These factors set the stage for out-migration from South Dakota to other places that are perceived to have job opportunities with higher income. Recently, this out-migration has slowed, and reversed in the 30-40 year old category as they return to South Dakota. Quality of family life issues are listed as key reasons for these people to return to their home state.

South Dakota has five reservations for Native Americans. The Native American population represents eight percent of the total state population. Three of the counties with reservations have been listed among the ten poorest counties in the United States. Unemployment, alcoholism, poor diet, diabetes and other health and social problems are prevalent in these areas. South Dakota State University has developed working agreements with the four 1994 Land Grant Institutions located in South Dakota, and is continuing to offer programs that address these social and economic needs.

Agriculture is the largest sector of the state's economy, generating a total impact of $16.8 billion in 2002. Fifty-five percent of all farms earn less than $50,000 per year, while 41% earn between $100,000 and $499,999 each year. Four percent earned $500,000 or more. This indicates there are two types of agriculture being conducted in South Dakota: large-scale and small-scale agriculture. Currently, there are 31,742 farms that average 1,379 acres.

The Northern Great Plains was known as the Great American Desert during the 19th Century. Numerous types of stress continues to be a part of living in the Northern Great Plains. A major emphasis of SDSU research and Extension programs is aimed at assisting citizens in dealing with the various forms of stress that are a part of living here. To highlight this commitment to stress-related research and education, the ABS College adopted the Biostress philosophy during the early 1990's.

Biostress has been used as a term to recognize the various forms of stress; biotic, edaphic, climatic, economic, and even sociological. Additionally, the Biostress philosophy has been used as a concept to implement broad interdisciplinary programs at SDSU. To solidify this concept, the Northern Plains Biostress Laboratory was dedicated in 1993. AES scientists, Extension specialists and teachers of diverse departments and disciplines work together and share resources.

The South Dakota Agricultural Experiment Station has research facilities at eight primary locations within the state. Most of the scientists are located at the main campus in Brookings, but they conduct research throughout the state. Scientists are also located at the SDSU West River Ag Center at Rapid City. The West River Center serves as the primary host for AES programs west of the Missouri River. Project leaders are also located at the Dakota Lakes Research Farm near Pierre (central SD) and at the Southeast South Dakota Research Farm near Beresford. These two farms focus on farming systems research, with no-till technology and irrigation being emphasized at Dakota Lakes and diversification of corn/soybean rotations and livestock feeding being emphasized at the Southeast Farm.

There are four research farms that are continuously staffed with support personnel. The AES scientists from Brookings and Rapid City conduct research at these stations, however, project leaders are not permanently located there. Crop production research is conducted at the Northeast Research Station near Watertown and at the Central Crops and Soils Research Station near Highmore. Neither of these stations are irrigated. Beef, sheep, and range research is conducted at the Antelope Station near Buffalo in Northwestern SD and at the Cottonwood Station in the West-Central part of the state.

There are also several locations where AES research is conducted on cooperating stakeholder property. These cooperative arrangements greatly augment our research capabilities and provide direct linkages with many of our rural stakeholders.

In addition to applied research conducted by AES scientists, the Cooperative Extension Service is also doing on-farm research across South Dakota. This takes the form of demonstration projects help interpret AES applied research, and help transfer information from the scientist to the agricultural user. Each year, more than 48,000 Extension field demonstration plots across South Dakota provide farmers with direct access to applied research data specific to their local conditions.

The Cooperative Extension Service has offices located in all 64 organized South Dakota Counties. An individual Memorandum of Agreement with each of the 64 counties documents the relationships, and establishes County Extension Advisory Boards. At the Field Education Unit level, county representatives of these boards provide input on programming efforts. The combined presence of Agricultural Experiment Station Research Farms and County Extension Offices across the state means that the South Dakota State University College of Agriculture and Biological Sciences is uniquely able to deliver educational services and meet the needs of the people of South Dakota.

This integrated Annual Report is a summary of the College's activities for Federal Fiscal Year 2003, as required by the Agriculture Research, Extension, and Education Reform Act of 1998 (AREERA). This report incorporates the five national goals established in the Cooperative State Research, Education and Extension Service (CSREES) Agency Strategic Plans and linked to the five national goals within the Research, Education and Economics Mission Area of the U.S. Department of Agriculture. This annual report summarizes programs that are built on substantial stakeholder input from all segments of South Dakota.

FY 2003 Annual Report of Accomplishments and Results

Goal 1: Enhance Economic Opportunities for Agricultural Producers. *(Previously Goal 1: An agricultural system that is highly competitive in the global economy.)*

1862 Research - X
1862 Extension - X

Program Description: Competitive and Profitable Agricultural Production Systems

Overview:
The SDSU Cooperative Extension Service and Agricultural Experiment Station have integrated activities to develop and support competitive and profitable agricultural production systems. This is accomplished by: 1) providing improved and sustainable agricultural and risk management skills and practices that allow producers to be competitive and profitable in the global agricultural market; 2) expanding genetic foundations for crops and livestock; 3) refining research-based management tools that address biotic and abiotic stress in the Northern Plains; and, 4) identifying and evaluating new agricultural products and value-added opportunities. The Cooperative Extension Service and Agricultural Experiment Station have achieved a number of results in support of the goals listed above. These include:

Program: Management Systems
Output: Management systems are continually evaluated to determine greater efficiency leading to increased productivity and/or profit. These systems must perform in the full range of economic and environmental settings. This gives producers the management tools to make appropriate decisions during times of natural disasters like floods, storms or drought; as well as during times of economic downturn which may have causes reaching beyond agriculture. For example, during this reporting period, South Dakota continued to experience one of the worst droughts in recorded history, surpassing that of the 1930s. From testing water quality to assure livestock health, to reformulating rations to reflect government rations of nonfat dry milk for livestock, SDSU worked closely with producers to revise their management systems and survive the drought. Efforts to assist farmers and ranchers deal with the drought are described in greater detail as a Key Theme.

Outcome: The Cooperative Extension Service, working closely with the scientists of the Agricultural Experiment Station, re-evaluated all crop and livestock management practices for times of drought. One area of great interest how poor water quality due to drought conditions effects livestock productivity. Revised drought management practices were publicized and distributed to all producers using media, meetings, and individual contacts. In each case, care was taken to subtly incorporate family issues and stress management in the ag production information.

Impact: South Dakota is still dealing with the drought. While crop and livestock losses now top $2 billion, farm and ranch families have been given information necessary to cope with the financial crisis. It will be many years before the economic impact can be measured. But today, communities and neighbors are more sensitive to the stresses endured by farm and ranch families.

Program: Crop Systems

Output: SDSU is a national leader in the development of no-till and precision farming systems, and has contributed significantly to the growing body of knowledge for these systems. In addition, SDSU continues to develop crop cultivars, germplasm and inbred lines developed and released for soybean, spring wheat, winter wheat, rye, flax, corn, oats, sunflowers, forage crops, turfgrass, woody horticultural plants and other appropriate crops.

Outcome: The SDSU crop breeding program provides varieties adapted to South Dakota growing conditions. Additional performance testing documents which varieties will perform best in South Dakota's climate.

Impact: SDSU-developed crop varieties are used extensively throughout South Dakota and the Northern Great Plains region. A 2002 survey of wheat variety use (USDA-NASS, 2002) showed that SDAES varieties were used on approximately 61% of the 2.95 million acres planted to wheat in 2002. Considering that the average yield for wheat is 37 bushels per acre at $3 per bushel, SDAES varieties and agronomic research generated nearly $200 million of revenue in 2002 alone.

Program: Livestock Systems

Output: SDSU programs literally extend from the farm gate to the consumer's plate, and range from programs that test for and control new diseases, to efforts to restructure cuts of beef to achieve greater value for the producer and increased acceptance by the consumer.

Outcome: SDSU research has improved the control of nematode parasites in cattle. Scientists have also identified new ways to cut the beef carcass, leading to increased value for cuts that previously had lower prices at the meat counter. These outcomes hare described in greater detail in the Key Themes section of Goal One.

Impact: These two areas alone have earned an additional $3 million for the South Dakota beef industry. Using new nematode control measures, South Dakota cattle producers retain just under $1 million each year that had previously been lost to parasites. And, restructured beef cuts contributes an additional $2 million in added value to beef producers.

Assessment:
The programs of the Cooperative Extension Service and Agricultural Experiment Station have enhanced agricultural production systems, helped individual producers increase the profit potential of their enterprises, and led to the production of higher quality product at greater profit. Extension specialists and educators, and AES scientists have developed multi-state and interdisciplinary relationships which allow them to share new knowledge, and utilize the strengths of each entity for the overall benefit of stakeholders. The following Key Themes offer greater detail regarding the contributions and value of the land grant system in South Dakota.

GOAL ONE FUND SUMMARY

Total Expenditures by Source of Funds

Hatch	1,782,230
State Match	1,770,600
FTE	159.3
Smith Lever	1,009,521
State Match	1,101,794
FTE	50.74

Key Themes for Goal One

Key Theme: Management Systems – Drought "Water Quality Affects Cattle Profitability"

Brief description of the activity - When cattle on a ranch in western South Dakota died for no apparent reason a few years ago, South Dakota Cooperative Extension Service workers tested for disease and searched for toxic plants before zeroing in on the cause of the livestock deaths: bad water. Poor water is always a leading concern of cattle producers. But during drought years, the concern grows to critical proportions as water evaporates, leaving producers faced with the decision of whether to haul water or sell the cattle.

The SDSU Cooperative Extension Service and Agricultural Experiment Station teamed up to study how water quality affects cattle, and ranchers' profits. The study focused on the impact of water quality on animal weight gain, health and profitability. The research found that cattle drink less if water is high in total dissolved solids, though scientists don't know if that's because of the taste, the smell, or perhaps because the water affects them physically in some way. And it's not always clear which poses the greater risk for livestock, total dissolved solids or specific compounds such as sulfates.

Current guidelines show levels of total dissolved solids and other compounds in livestock drinking water that can cause production and/or health problems in livestock. The SDSU study, however, indicates that problems may arise at lower levels than suggested by the guidelines. The study found that pastured steers on good quality water gain about two-tenths of a pound per day more than those on the poorer water. Calves raised in a feedlot setting also performed noticeably better if they had access to quality water.

Short impact statement - The SDSU study gives ranchers guidelines for water quality, allowing them to determine for themselves whether it is cost-effective to provide alternative water supplies to livestock. Each ranch has different circumstances. Those with poor water may find it necessary to connect to rural water systems, drill new wells, or perhaps use management techniques such as grazing early in the year when water quality is better. The study also helps landowners determine fair pasture rental values, based on the quality of the water on their property. Using information gained in this study, the Cooperative Extension Service worked with land owners and livestock producers to test water quality, and offer recommendations leading to improved beef profitability.

Source of Funding
Smith Lever
Hatch
State – State Funds

Scope of impact, identifying which of the following apply to the activities conducted
(1) State specific
(1) Integrated Research and Extension

Key Theme: Management Systems – Drought "Nonfat Dry Milk Program for Drought-Ravaged Livestock"

Brief description of the activity **–** Responding to worsening drought conditions, the Federal government authorized emergency distribution of nonfat dry milk. It was intended to be used as a protein supplement in livestock feed to producers in the 13 hardest hit counties in South Dakota, as well as in other states.

The South Dakota Cooperative Extension Service helped develop and implement the distribution of the program, and also was responsible for program promotion and sign-up. Producers who participated were awarded a voucher which could be used for nonfat dry milk, or could be bartered for other livestock feed. The program allowed a 30 day supply of nonfat dry milk, at a ration of two pounds per head per day. If the dry milk were bartered, it was assigned a value of $2.40 per cow. Producers were encouraged to incorporate the nonfat dry milk into rations that would help them delay turnout of livestock into early spring pasture. It served as a highly degradable protein source, and also as an energy source.

Extension specialists and educators helped producers sign up for the program, develop workable rations and feeding programs, and also to evaluate whether to barter the vouchers for other feed or use the nonfat dry milk directly in rations.

Short impact statement - Of the 1,907 South Dakota producers that received vouchers, 1,668 bartered the vouchers for other livestock feed. The nonfat dry milk vouchers helped producers stretch pasture supplies, and was another tool in managing the devastating impact of the drought.

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Source of Funding
Smith-Lever
State – State Funds

Scope of impact, identifying which of the following apply to the activities conducted
(1) State Specific

Key Theme: Crop Systems "$2 Investment in Precision Farming Pays $10"

Brief description of the activity - Precision agriculture means intensive management of agronomic production to increase the productivity and profitability of farming systems. South Dakota State University Professor of Agronomy David Clay says producers are learning how to make economically based decisions. "We are linking agronomy with economy and making that information available to farmers so they can make decisions that are more likely to make money for them."

Research-based workshops and information provided by the Cooperative Extension Service have helped producers learn to interpret and integrate digitized soils information and yield monitor data. Dale Tjarks, who farms 1000 acres of corn and soybeans near Flandreau, S.D. uses precision techniques to distribute fertilizer. "I soil sampled by field in 2.5 acre grids. Based on this information, we can make fertilizer recommendations for each grid. The goal is to apply only what the plant needs that season, so there is no waste. That's also going to help the groundwater."

Short impact statement - Using precision farming methods, farmers have documented that a $2 per acre investment in equipment can increase profits by $7 to $10 per acre. Ron Alverson, a farmer from Chester, S.D. found that a uniform nitrogen application rate on corn that maximizes yield response across all soil types almost invariably results in over-application on much of the field. "Targeting nitrogen application rates by soil characteristics has resulted in an average annual nitrogen cost savings of about $7 per acre," he said.

Adjusting seeding rates for corn to match field production capacity has resulted in a $2 per acre savings. Other decisions based on precision farming data can lead to additional savings, and a reduction in chemical inputs for crops. The ultimate impact is greater production capacity and profitability for farmers through the appropriate use of inputs on specific portions of land. This production method targets the use of agricultural chemicals to specific areas of need, thus reducing chemicals used in the production of crops and ultimately protecting the environment.

Source of Funding
Hatch
Smith-Lever
State – State Funds

Scope of impact, identifying which of the following apply to the activities conducted
(1) State specific
(4) Integrated Research and Extension

Key Theme: Crop Systems "Corn Rootworm Control"

Brief description of the activity – Corn is a major crop in South Dakota, and rootworm is the number one pest. Chemical control measures have previously been used to protect corn from rootworm. But now, Bt corn offers the promise of protecting corn from rootworm without the use of pesticides, which may also harm the environment if not used correctly. South Dakota leads the world in the adoption of agricultural biotechnology, meaning producers grow more Bt corn here than in other states. And now, four companies are pursuing their own transgenic crops that would protect against rootworm.

South Dakota State University plant scientists have evaluated transgenic corn and soybeans in order to determine whether the new seed technology works as promised by corporate manufacturers, and also to confirm that the transgenic process is environmentally safe, and poses no threat to human and animal consumers.

Short impact statement – SDSU research has provided solid evidence that consuming transgenic corn and soybeans have no negative effect on fetal to adult development and physiological well being. The work should support consumer acceptance and the export of transgenic crops from South Dakota. In addition, research has documented that transgenic crops are an environmentally safe way to control pests without the use of pesticides.

Source of Funding
Hatch
State Funds

Scope of impact, identifying which of the following apply to the activities conducted
(1) State Specific

Key Theme: Crop Systems "No-till Farming Expands Crop Options"

Brief description of the activity – Much of central and western South Dakota are consistently arid, a situation that supports rangeland and wheat. But crops and grazing systems that require higher moisture have historically not been successful under these stressful conditions. As a result, farmers and ranchers in these arid areas have not had access to production systems which generate higher profits.

South Dakota State University has become a national leader in the development of no-till farming systems, through research conducted at the Dakota Lakes Research Farm. No-till systems allow farmers in central and western South Dakota to reduce fallow acreage and utilize rotations having a larger proportion of high-water-use crops. Consequently during the 1990s, spring and winter wheat production remained constant or decreased slightly while the production of corn, soybeans and sunflowers increased dramatically.

Short impact statement - The adoption of no-till production practices in central and western South Dakota have caused a substantial increase in higher-profit crops in areas that traditionally endure drought conditions with greatly reduced soil erosion. From 1991 to 2000, arid regions of central South Dakota have increased spring wheat production by 52%; corn production by 88%, sunflower production by 140%, and soybean production by an incredible 977%. In addition, no-till farming systems resulted in expanded opportunities for dairy and beef feeding in central and western South Dakota.

Source of Funding
Smith Lever
Hatch
State – State Funds

Scope of impact, identifying which of the following apply to the activities conducted
(4) Integrated Research and Extension

Key Theme: Crop Systems "Weed Control"

Brief description of the activity - Weeds continue to be the greatest on-going threat to food production. While herbicides are used on nearly 100% of row crop acres, effective weed management is still one of the most challenging issues in production agriculture. Herbicides alone are not the answer to weed control. Producers must understand proper timing of herbicide application to achieve optimum control. Weeds continue to evolve, some becoming so threatening they are considered noxious weeds, the "Most Wanted" pests of the weed community. In South Dakota, there are more than five million acres currently infested with noxious weeds, costing more than $160 million in lost agricultural production. And now, evidence suggests that some weed biotypes are becoming resistant to herbicides.

The South Dakota Cooperative Extension Service, working closely with the Agricultural Experiment Station, has developed a series of highly effective programs that help producers understand and practice effective weed control program. Participants learn to evaluate the various herbicide control measures available for specific weed problems, and apply the chemicals according to label directions in a manner that presents the least risk of environmental contamination or threat to applicator health. These programs include demonstration plots; special training programs for chemical applicators, dealers, consultants and producers; and mandated noxious weed educational programs for land owners and managers.

Short impact statement - Extension weed control efforts have helped producers control weeds, ultimately earning more money from their crops. For example, the proper timing of herbicide applications helped producers increase corn yields by 25 bushels an acre, resulting in an additional $5,000 for each 100 acres. Research demonstrates that recommended weed control practices return $1.34 for each $1.00 invested in control efforts.

Source of Funds
Hatch Funds
Smith Lever Funds
State – State Funds

Scope of impact, identifying which of the following apply to the activities conducted
(1) State Specific
(4) Integrated Research and Extension

Key Theme: Crop Systems "Attitudes Toward Biotechnology"

Brief description of the activity - South Dakota leads the world in the adoption of agricultural biotechnology. Even though producers have eagerly adopted transgenic corn and soybeans, there is still concern that consumers either misunderstand or do not trust food sources which have been developed through biotechnology. To document consumer and producer attitudes toward biotechnology, SDSU social scientists attempted to determine what values were used to make judgments regarding the usefulness and safety of biotechnology. Previous SDSU research has provided solid evidence that consuming transgenic corn and soybeans has no negative effect on fetal to adult development and physiological well-being. The work should support consumer acceptance and the export of transgenic crops from South Dakota.

This study revealed that there is tremendous range in opinion. Less than one-third felt some level of discomfort with biotechnology, and a very small minority said is was absolutely wrong. Two-thirds of those sampled supported biotechnology, some indicated that it is appropriate if it will address positive factors including improved nutrition.

Short impact statement - Science already has proven the safety of Bt corn, Roundup Ready soybeans, and other biotech crops. But consumer opinion, especially in other countries, is

still forming. The United States has the most liberal laws and regulations regarding biotech crops. While the crops have been proven to be safe, consumer opinion will drive their value.

The SDSU study of consumer attitudes document public sentiment, and also will also help assess specific impact on consumers, small farms and wholesalers and retailers that comprise the food chain.

Source of Funds
Hatch Funds
State – State Funds

Scope of impact, identifying which of the following apply to the activities conducted
(1) State Specific

Key Theme: Livestock Systems "Cattle Parasites"

Brief description of the activity - A reoccurring problem for cattle producers is the issue of parasites, specifically nematodes, that infect cattle on summer pasture. Losses from these parasites typically range in the 10-15 pound per animal range. While this is not a major loss, it is a drain on the overall profitability of the cattle operation. As producers become more efficient, managing a loss on this level is one more way to assure higher profits. South Dakota State University biologists and animal scientists have studied the feasibility of using a spring-time deworming program to diminish losses from nematode parasites. Research determined that most parasitic infection occurred from mid-May to the end of June. Spring deworming was proven to decrease nematode infections by 88 percent, and capture the majority of the calculated nematode losses.

Short impact statement - Prior to 1998, spring deworming was extremely uncommon among South Dakota cattle producers. Thanks to SDSU research and extension programs, more than 120,000 beef cow-calf pairs are spring dewormed. After subtracting costs associated with deworming the cattle, this translates to an economic advantage of approximately $898,000 per year for the cow-calf industry in the region.

Source of Funds
Smith-Lever
Hatch Funds
State – State Funds

Scope of impact, identifying which of the following apply to the activities conducted
(4) Integrated Research and Extension

Key Theme: Livestock Systems "Restructuring Beef Cuts for Increased Consumer Acceptance"

Brief description of the activity - Not all cuts of beef generate high profits for the packer, and ultimately the producer. Some cuts are undervalued by consumers, lowering the price consumers are willing to pay for a less desirable cut of beef. South Dakota State University has studied consumer acceptance of several underutilized muscles from the beef chuck. If the top blade and boneless arm are marketed as steak rather than chuck roast, the value of a beef carcass could increase by $7.00 Moreover, research revealed that beef steaks from the 5^{th} through 12^{th} rib sections were acceptable to consumers, meaning that current fabrication methods could be modified to obtain four more marketable rib eye steaks per beef carcass.

Short impact statement - Restructured beef cuts will result in an additional $7.80 per head at the retail level, or approximately $3.67 added value per head for the beef producer. These improvements in meat processing have a potential impact of $5 million in retail value, and $2 million of added value for beef producers.

Source of Funds
Smith-Lever
Hatch Funds
State – State Funds

Scope of impact, identifying which of the following apply to the activities conducted
(4) Integrated Research and Extension

Goal 2: Support Increased Economic Opportunities and Improved Quality of Life in Rural America. *(Previously Goal 5: Enhanced economic opportunity and qualify of life for Americans)*

1862 Research - X
1862 Extension - X

Program Description: Economic Opportunity and Quality of Life

Overview:
The SDSU Cooperative Extension Service and Agricultural Experiment Station work jointly to enhance economic opportunity and overall quality of life. This is accomplished by: 1) helping families learn how to cope with challenges and meet individual needs, allowing them to be more resilient to stress and crisis; 2) mobilizing community development efforts that enhance local job opportunities, community facilities and services, housing and strengthen the perceived future of the individual community; 3) advocating retirement planning, and initiating efforts to enhance the quality of life in senior years; 4) fostering volunteerism; 5) helping youth to become self-reliant, productive members of society;

6) providing career opportunities through higher education; and, 7) identifying, studying and communicating opportunities to improve rural economies and standards of living. The Cooperative Extension Service and Agricultural Experiment Station have achieved a number of results in support of the goals listed above. These include:

Program: Improved Quality of Life
Outputs: SDSU has several programs that address sustainability and improvement of quality of life issues. From increasing rural tourism opportunities, to the development of a bio-based energy system, SDSU actively works to improve economic opportunities, leading to strengthened families and personal finances.
Outcomes: The federal government has authorized further development of the Sun Grant Initiative, expanding the role of land grant universities to study and develop biobased energy systems. On an individual level, SDSU's Entrepreneurship through Agritourism program is helping individual rural families develop and market specialty crops, and branch into related areas such as rural tourism opportunities, including bed and breakfast establishments, wineries, and farmers markets.
Impacts: From the promise of new energy systems from renewable sources, to a new Agritourism-based segment of the state economy, SDSU programs help stakeholders grow new opportunities for jobs and increased economic expansion.

Program: Continued Economic Development During Drought
Output: With the continuation of severe drought conditions, SDSU has placed a high priority on assisting stakeholders to deal with the myriad of challenges from this natural disaster. On a large scale, this includes "Hands Across South Dakota," an effort to assess agricultural and family needs and deliver emergency supplies. On a more personal scale, it involves teaching livestock producers how to use distillers grains as replacement feed sources.
Outcome: The assessment of emergency needs documented that livestock producers urgently needed feedstuffs equaling a 26 mile long convoy of tractor trailer trucks. This documentation led to donations from across the state, helping ranchers maintain livestock herds rather than completely selling this vital source of family income. In addition, 529 families received emergency financial assistance of $300.
Impact: The emergency assistance helped some families stay on the ranch, maintaining the promise of future economic opportunity for their local communities.

Program: Youth and Family Development
Output: SDSU offers numerous educational opportunities that help young people experience the value of the local agricultural economy, personally identify opportunities to earn money, and learn fiscal responsibility. Because South Dakota has a substantial Native American population, SDSU strives to incorporate Native American values in educational programs, such as Character Counts.
Outcome: Entire school districts participate in these educational programs. For example, 23 school districts participate in the Youth Ag Day program. A Youth Entrepreneurship program called "Mini-Society" has been piloted with 350 children, and is now offered to school districts as an in-class project for entire grade levels.

The program "We Are All Relatives" has been piloted in nine South Dakota school districts as well as schools in three other states.
Impact: Students learn about character, fiscal responsibility, and cultural values, offering the promise of a lifetime of service to their communities. Ultimately, this leads to enhanced economic opportunities for future generations.

Assessment:
The programs of the Cooperative Extension Service and Agricultural Experiment Station have strengthened economic opportunities and offered programs to enhance the quality of life in South Dakota and the region. Programs of the Cooperative Extension Service have increased youth competence in the area of personal, social and citizenship skills. Families are more resilient to stress, and have practiced improved financial planning for all life stages, particularly retirement. Agricultural Experiment Station scientists have identified how value-added industries work to capture economic opportunities for agricultural producers and rural communities. SDSU continues to be a leader in the development of a nationwide model to study ag-based bio-energy opportunities, leading to the federal authorization of the Sun Grant Initiative within the Land Grant System. SDSU research clarifies that development of value-added industries will require strong communication and team efforts between producers and rural community residents. Extension specialists and educators, and AES scientists have developed multi-state and interdisciplinary relationships that allow them to share new knowledge, and utilize the strengths of each entity for the overall benefit of stakeholders. The following Key Themes offer greater detail regarding the contributions and value of the land grant system in South Dakota.

GOAL TWO FUND SUMMARY

Total Expenditures by Source of Funds

Hatch	261,513
State Match	271,116
FTE	17.6
Smith Lever	1,336,423
State Match	1,196,481
FTE	54.34

Key Themes for Goal Two

Key Theme: Quality of Life "Entrepreneurship through Agritourism"

Brief description of the activity - While the foundation of South Dakota's economy is agriculture, tourism represents an area of growing economic opportunity. To capture value from tourism, South Dakotans are learning how to capitalize on the rural opportunities of the Midwest. Beyond hotel rooms and meals, earning additional value from tourism opportunities often means marketing local produce to visitors.

South Dakota State University has worked to support producers and growers in the production and marketing of specialty crops and products. Scientists in the Agricultural Experiment Station have evaluated fruit cultivars and varieties to provide a foundation for the state's growing wine industry. The Cooperative Extension Service helped form the South Dakota Specialty Growers Association, and provides assistance in planning, marketing and promoting specialty products. SDSU also evaluates processing methods to assure the safety of South Dakota produced specialty foods. The result is the development of a new segment of agriculture that produces and sells specialty products to targeted consumer groups, including people who visit the area.

Short impact statement - Agritourism has been established as a new segment of the South Dakota economy. South Dakota specialty products available to consumers include: honey, wine, flowers, farmers market produce, and fruits and vegetables from commercial gardens. As this component of the economy continues to develop, South Dakota will realize increased value from agritourism.

Source of Funding
Hatch Act
Smith-Lever 3(b) & (c)
State – State Funds

Scope of impact, identifying which of the following apply to the activities conducted
(1) State Specific

Key Theme: Quality of Life "Control of the West Nile Virus"

Brief description of the activity – In 2003, The Centers for Disease Control and Prevention reported 1,038 human cases of West Nile Virus in South Dakota. There were 14 deaths from the virus. This represents 11 percent of the total number of human West Nile cases reported in the United States. Given South Dakota's low population of just over 750,000 people, the state experienced one of the highest per capita West Nile case loads in the United States.

Even before the West Nile virus was detected in humans in the state, South Dakota State University, in cooperation with the South Dakota Department of Health, was a key part of a statewide effort to monitor the disease and provide educational information to the public. The Cooperative Extension Service operated a statewide mosquito and bird collection system designed to monitor early indicators of the presence of the virus. The SDSU Animal Disease Research and Diagnostic Laboratory tested more than 1700 samples from horses suspected of having the virus. The Cooperative Extension Service also played a key role in statewide educational efforts for mosquito control. All cities and municipalities in the State of South Dakota received a detailed handbook describing mosquito control options, appropriate use of pesticides and equipment, and contact information where communities could receive additional help.

Special seminars were held for 250 community decision makers covering the disease, the biology of the mosquito, and options for municipal mosquito control programs. The Extension Service also produced and distributed a series of educational materials for the general public. Distributed materials included 100,000 adult mosquito control/DEET application wallet cards, 4,000 mosquito control/DEET application posters, and 60,000 West Nile Virus Educational activity books for youth. Extension, in cooperation with the State Department of Health and State Medical Association, produced a 30 minute television special which focused on West Nile virus, including prevention and control options, and medical recommendations for people who felt they may have the virus.

Short impact statement - Because of Extension's efforts to help communities and individuals use pesticides according to label instructions, there were no reports of human illness from pesticides, nor were there reports of environmental contamination. Applicators followed state and federal guidelines and applied pesticides according to label directions. In addition, South Dakotan's across the state took up the message of mosquito control. They drained standing water and used mosquito repellants containing DEET. At a summer youth camp, participants refused to go outside for recess until they had put on DEET, a practice they learned from activity books in school three months earlier.

Teachers and parents commented: "The books helped us teach the children and their parents about a subject we had heard about but knew very little about." And, "my children have been busy telling the neighbors to keep fresh water in their bird baths."

While the state did experience 1,038 human cases of West Nile virus, the educational efforts of South Dakota State University undoubtedly prevented hundreds of additional cases and deaths.

Source of Funding
Hatch Act
Smith-Lever 3(b) & (c)
State

Scope of impact, identifying which of the following apply to the activities conducted
(1) State Specific

Key Theme: Continued Economic Development "Hands Across South Dakota"

Brief description of the activity - Northwest South Dakota has endured one of the harshest droughts since the 1930s. Statewide, the drought caused nearly $2 billion in economic losses in the agricultural sector. But hardest hit were the families in eight counties in northwest South Dakota, the heart of the drought.

County Extension Educators with the South Dakota Cooperative Extension Service were instrumental in assessing agricultural and family needs, garnering donations, and delivering support. As the drought developed, Extension Educators formed a citizen group to develop contingency plans for what would be needed if the drought worsened. A list of five needs were identified, including: feed for livestock, medical assistance for families, counseling, job training, and personal support. As the situation worsened, people in drought stricken areas were invited to apply for assistance. These applications documented the need for livestock feed in the form of: 45,028 bales of hay, 642 tons of range cake, 86,000 bushels of corn, 6,375 bushels of oats, 4,160 barrels of protein supplement and 800 bags of soybean meal. It would have taken 1,370 tractor trailer units to deliver the livestock feed. If these trucks were lined up bumper to bumper, the line would stretch out more than 26 miles.

Nearly all livestock producers who applied received 1.5 tons of Dried Distiller's Grain. For most, this was the first time they fed this co-product of ethanol to their cattle. Extension Educators and specialists assisted livestock producers in balancing rations, using alternative feeds and answering questions about this new feed source. Now that the drought is starting to subside, these producers have a better understanding of how DDG can lower their feed costs. One individual created a business and is distributing DDGs as a feed source.

The livestock needs represented only a portion of the situation. Five hundred and twenty-nine families also applied for special financial assistance. Needs most often listed included food assistance, help paying for medical bills, and help paying for prescription medicine. In January, the first month applications were accepted, one family urgently requested a furnace. It is important to note that many of these requests came from families that previously were considered prosperous. The building drought had drained their financial reserves, creating a truly desperate situation. Thanks to donations from across the state, the "Hands Across South Dakota" was able to deliver livestock feed and $300 in cash to most families.

Short impact statement - Each person who applied for assistance was provided additional Extension information to help them through the difficult time.

The impact of such a momentous effort is measured in the life of each person helped. As a result of this undertaking, some families were able to stay on the ranch. For others, the most important impact was simply knowing that other people cared and offered their support.

Source of Funding
Smith-Lever 3(b) & (c)
State

Scope of impact, identifying which of the following apply to the activities conducted
(1) State Specific

Key Theme: Continued Economic Development "Distillers Grains Provide Feed Options During Drought"

Brief description of the activity – Hay shortages and high feedstuff prices have been the norm this past year, a situation compounded by drought conditions across much of the Midwest. In the past, when a producer ran out of hay because of the drought, the only remaining option was to sell down the herd. But now, new feed options based on distillers grains are available, allowing producers to keep herd during times of drought. Most importantly, it may allow farm families to maintain their income source and way of life. Scientists at South Dakota State University have investigated how different levels of distillers grains affect performance of feedlot animals, grazing animals and dairy cattle. They concluded that it is possible to ad up to 40% distillers grains in the diet of feedlot cattle and still get successful gain and performance. "Going past 40% may cause waste management problems because of excess nitrogen and phosphorus," cautioned SDSU Extension Beef Feedlot Specialist Kent Tjardes.

For grazing cattle 20% distillers grains in the diet should be the maximum. "The high fat content of distillers grains limits how much you want to use," said SDSU Extension Beef Specialist Cody Wright. "Grazing cattle have more roughage in the diet. High starch feeds will alter the rumen microbial population, resulting in depressed forage intake and digestibility. Since distillers grains contain little starch, forage utilization is not affected. However, the rumen microbes are sensitive to fat, so 20 % of the total diet is the maximum." Twenty percent is also the maximum amount to be fed to dairy animals, and still have a nutritionally sound diet.

Short impact statement - Distillers grains are a good way to stretch forage supplies in a drought year because they make an affordable yet high quality feed. SDSU scientists have documented the amount of distiller's grains that are appropriate for cattle on feedlots and on pasture, as well as for dairy animals. "You can drop production costs, increase quality and produce more milk by using distillers grains," confirmed SDSU Extension Dairy Specialist Alvaro Garcia.

Source of Funding
Hatch
Smith-Lever 3(b) & (c)
State

Scope of impact, identifying which of the following apply to the activities conducted
(4) Integrated Research and Extension

Key Theme: Continued Economic Development "Distillers Grains in Swine Diets"

Brief description of the activity – Drought has boosted the cost of corn and soybean meal for swine producers. Thanks to research at South Dakota State University, swine producers can rely on a new feed source from dried distillers grains. Distillers grains have mostly been a cattle feed, but may be even more ideally suited for swine rations. Today's distillers grains are much higher in nutritional value than in the past. Modern distillers grains contain three times more phosphorus than cattle require. Swine, however, can utilize all the digestible phosphorus in the distiller grains, eliminating most problems of excess phosphorus in the manure. SDSU scientists and Extension specialists confirmed that distillers grains can replace corn and some soybean meal in swine diets. Producers can use about 20% of for nursery pigs; 20-30% for grow-finishing pigs and lactating sows; and, up to 40% for gestating sows," said SDSU Swine Nutritionist Hans Stein. SDSU developed an internet-based distillers grain ration calculator for swine feed.

Short impact statement - Scientists and Extension specialists have helped swine producers utilize a new feed source available in the form of distillers grains. This gives swine producers increased feed options during times of drought.

Source of Funding
Hatch
Smith-Lever 3(b) & (c)
State

Scope of impact, identifying which of the following apply to the activities conducted
(4) Integrated Research and Extension

Key Theme: Youth and Family Development "Native American Values in Character Counts"

Brief description of the activity – Native American traditional values and culture are strong influences on classroom learning. More than seven percent of South Dakota's population is Native American. The South Dakota Cooperative Extension Service 4-H Character Counts Program produced a K-12th grade resource connecting the four Lakota/Dakota traditional values with the Six Pillars of Character in Character Counts. The materials were written by two tribal members who are also experts in Native American education. Their ideas for lessons and activities, as well as ideas from their Native American colleagues, were formatted using the Experiential Learning Model. It is divided into five grade ranges: K-1, 2-3, 4-5, 6-8, and 9-12. Produced under the title, "We Are All Relatives," the curriculum was piloted in nine South Dakota schools, and three schools in other states.

Short impact statement - More than 40 school districts have ordered the curriculum. These requests have come from Extension Indian Reservation Project participants across the nation, neighboring state universities and the South Dakota public and tribal school systems. Plans are underway to offer training in South Dakota to help teachers better understand American Indian culture, as well as demonstrating the use of the curriculum in actual classroom settings.

Source of Funding
Smith-Lever 3(b) & (c)
State

Scope of impact, identifying which of the following apply to the activities conducted
(3) Multistate Extension

Key Theme: Youth and Family Development "Youth Entrepreneurship"

Brief description of the activity – Children growing up in America are exposed to cultural and societal messages of wealth that the world has never previously experienced. Even children raised in poverty are exposed to images of wealth. These images shape the child's perception of wealth, and influence their ability to manage and save money. The South Dakota Cooperative Extension Service has piloted a program entitled "Mini Society." This is an experience-based approach to teaching children entrepreneurship concepts within the concept of a child's world. In this program, youth design and develop their own society, create a name for it, and develop their own type of currency. The children then identify tasks for which they will earn money and identify opportunities to establish their own businesses to provide goods and services to citizens. Participants acquire concepts and skills in multiple subject areas, discover the importance of cooperation, marshal their own creative and logical resources, learn about setting and achieving goals, and enhance their sense of empowerment and self-sufficiency.

Short impact statement - Designed for children ages 8-12, the pilot project has reached 350 youth who have practiced citizen responsibilities as they created a government and framework for their society. Three hundred young people practiced logical decision making as they created, produced and marketed products to other youth in the project.

Comments from participants indicated that they learned that having a business is tough, that you get more done when you work together, that prices have to be fair and most importantly, that these ideas can become part of the real life business community. Some have even indicated the type of businesses they want to open in the future.

The pilot project was so successful that school districts are requesting this as an in-class project for entire grades. One mother said, "after my children participated in this program, the I wants…. went away. Children understand that money doesn't just appear, and that it has value."

Source of Funding
Smith-Lever 3(b) & (c)
State

Scope of impact, identifying which of the following apply to the activities conducted
(3) Multi-State Extension

Key Theme: Youth and Family Development "Youth Ag Day"

Brief description of the activity – In northeast South Dakota, only one-third of the school aged children live on farms today, making it harder for them to understand the value and positive impact that agriculture has on their communities. Cooperative Extension Service offices in six South Dakota counties developed "Ag Youth Days," designed to teach youth about South Dakota agriculture through a series of fun, educational programs. Each fall, students 23 from different school districts come to a central location for the program consisting of eight different learning stations. By rotating through each station, students learn about agricultural economics, food production, food safety, animal and product identification, agronomy, commodity product identification, dairy, and livestock.

Short impact statement - For the past two years, more than 1,600 third grade students from 23 school districts across a six county area participate in "Youth Ag Day." Teachers and parents report that after participating in the program, students have a greater understanding of agriculture. They know how agriculture is a part of their communities, and how the agricultural commodities grown on farms and ranches in their area make their way not only to their dinner table, but also become household products they use every day.

Source of Funding
Smith-Lever 3(b) & (c)
State

Scope of impact, identifying which of the following apply to the activities conducted
(1) State Specific

Goal 3: Enhance Protection and Safety of the Nation's Agriculture and Food Supply. *(Previously Goal 2: A safe and secure food and fiber system.)*

1862 Research - X
1862 Extension - X

Program Description: A safe and secure food and fiber system.

Overview:
The SDSU Cooperative Extension Service and Agricultural Experiment Station have integrated activities to further develop and support a safe and secure agricultural production system. This is accomplished by: 1) helping citizens adopt safe food selection, preparation, service and storage practices; 2) fostering rural-urban co-existence and use of natural resources by refining practices for the safe handling, storage and disposal of pesticides, livestock waste and other possible environmental contaminates; 3) studying the impact of present and future regulations on farms, producers, families and communities; 4) identifying and evaluating new marketing systems for agricultural products; and, 5) providing science-based information regarding the use and safety of transgenic crops. The Cooperative Extension Service and Agricultural Experiment Station have achieved a number of results in support of the goals listed above. These include:

Program: Food Safety – Biotechnology
Outputs: SDSU works to assure and improve food safety through numerous projects. For example, the SDSU Animal Disease Research and Diagnostic Laboratory offers a rapid test for Chronic Wasting Disease. This test allows hunters to quickly determine if the animal they harvested has the disease. SDSU also has studied current handling methods for biotech crops in an effort to determine whether infrastructure exists to segregate these crops.
Outcomes: SDSU is one of only 14 sites in the nation to offer the test for Chronic Wasting Disease. Tissue tests from across the Midwest have been sent to SDSU to help assure hunters that their game is safe to eat. SDSU studies have also determined that biotech crop segregation is more dependant upon price premiums paid, rather than whether the stored crop has biotech origins.
Impacts: From testing to assure the safety of meat from game animals, to documenting handling procedures for new biotech crops, SDSU research and Extension efforts are just one more step in a complex national food production system that assures consumers of the safety of their food.

Assessment:
The programs of the Cooperative Extension Service and Agricultural Experiment Station have fostered greater understanding of food safety among the citizens of the state, and have added to the growing body of knowledge regarding consumer acceptance of agricultural products, and the safety of transgenic food ingredients. SDSU provides scientific testing of dairy products, processed food, and other foods for overall safety, including the presence of E. coli 157.H7. The Quality Assurance Programs of the Cooperative Extension Service help farmers and ranchers implement production practices that foster the production of safe food. Extension programs also help students learn more about the role genetics play in the production of safe food. Extension specialists and educators, and AES scientists have developed multi-state and interdisciplinary relationships that allow them to share new knowledge, and utilize the strengths of each entity for the overall benefit of stakeholders. The following Key Themes offer greater detail regarding the contributions and value of the land grant system in South Dakota.

GOAL THREE FUND SUMMARY

Total Expenditures by Source of Funds

Hatch	18,001
State Match	18,496
FTE	.80
Smith Lever	320,266
State Match	279,847
FTE	13.35

Key Themes for Goal Three

Key Theme: Food Safety - Biotechnology "Segregation of Biotech Crops"

Brief description of the activity – South Dakota farmers plant the highest percentage of biotech crops in the nation. From Bt corn to Roundup Ready soybeans, farmers use crop technology to control pests and manage costs. But what happens to that crop when it leaves the field? Do elevators have the capacity to segregate biotech corn and soybeans? Currently, there is no state or federal law that requires biotech crops to be stored separately. South Dakota State University economists surveyed all grain elevators in the state to determine whether the storage infrastructure currently exists to segregate biotech crops. The study determined that crops currently are co-mingled. Segregation, when it does occur, is done on a very limited basis and was not dependant on the crop, but on the price premium. Elevator operators estimated that storage segregation costs would range from an additional three to 20 cents per bushel.

Short impact statement – This study could lead to increased price incentives in specialty markets for biotech, or non-biotech crops. For example, international markets currently do not purchase biotech crops. A segregated storage system, supported by proper documentation which documents purity, may lead to price incentives from specialty buyers.

Source of Funding
Hatch Act
State – State Funds

Scope of impact, identifying which of the following apply to the activities conducted
(1) State Specific

Key Theme: Food Safety - Biotechnology "Chronic Wasting Disease"

Brief description of the activity – Chronic Wasting Disease has been found in deer and elk across the Midwest. Although Chronic Wasting Disease is in the same family as Mad Cow Disease, there is no evidence that it is transmissible to humans.

Officials are working to track and control the spread of Chronic Wasting Disease in wild and domestic herds of deer and elk. South Dakota State University, along with 14 other state labs nationwide, will conduct rapid tests to screen for Chronic Wasting Disease. The test is available to state game biologists and hunters. SDSU provides results within 72 hours of receiving tissue from harvested animals.

Short impact statement – The SDSU testing service tracks cases of Chronic Wasting Disease in South Dakota. "It's also available to individual hunters if they wish to know the status of their deer or elk," said Dr. David Zeman, head of the SDSU Department of Veterinary Science. "The test is highly accurate in detecting CWD affected animals."

While there is no reason at this point to believe that CWD can be transmitted to humans or cattle, it is a disease that the public follows closely because of its linkage to prion diseases like Mad Cow Disease and Scrapie. CWD has existed in Colorado and Wyoming for at least 40 years with no evidence to date of the disease being transmitted to humans. While the risk to humans is small, it cannot be completely ruled out. Therefore it is wise to follow certain guidelines with wild game, including not consuming animals that have tested positive. The CWD test helps assure the public of a safe food supply, thus also protecting South Dakota's hunting/tourism industry.

Source of Funding
Hatch Act
State – State Funds

Scope of impact, identifying which of the following apply to the activities conducted
(1) State Specific

Goal 4: Improve the Nation's Nutrition and Health. *(Previously Goal 3: A healthy, well-nourished population.)*

1862 Research - X
1862 Extension - X

Program Description: A healthy, well-nourished population.

Overview:
The SDSU Cooperative Extension Service and Agricultural Experiment Station work jointly to foster and support the continued development of a healthy, well-nourished population. This is accomplished by: 1) providing information regarding healthy food choices, budgeting for food purchases, and proper diet; 2) enhancing the nutrition and health benefits, and consumer acceptance of agricultural products; 3) conducting agricultural safety training; and also assisting in adapting farms to operators with disabilities; and 4) conducting health maintenance programs focusing on preventative health care strategies.

The Cooperative Extension Service and Agricultural Experiment Station have achieved a number of results in support of the goals listed above. These include:

Program: Health and Nutrition
Outputs: SDSU has made substantial contributions to the area of human diet and health. In one project, dairy scientists developed a method to fortify process cheese with Vitamin D, creating only the third dietary source of this important vitamin. SDSU is also documenting the nutritional, pharmaceutical and agronomic properties of native plants, developing a new niche market for urban consumers.
Outcomes: SDSU scientists have created new or improved foods, many of which have improved health and/or nutritional properties.
Impacts: Because of SDSU research, consumers have expanded food choices. This translates into improved selection of available foods, leading to better nutritional opportunities for stakeholders.

Assessment:
The programs of the Cooperative Extension Service and Agricultural Experiment Station have improved the diet and nutrition of many South Dakotans, fostered greater safety among rural residents, enhanced the nutritional value of food, and helped clients cope with disabilities and continue to farm. Additional programs on food selection and choice, insurance and preventative health care have improved the quality of life for many South Dakotans. Extension specialists and educators, and AES scientists have developed multi-state and interdisciplinary relationships that allow them to share new knowledge, and utilize the strengths of each entity for the overall benefit of stakeholders. The following Key Themes offer greater detail regarding the contributions and value of the land grant system in South Dakota.

GOAL FOUR FUND SUMMARY
Total Expenditures by Source of Funds

Hatch	65,987
State Match	66,088
FTE	10.8
Smith Lever	250,721
State Match	252,995
FTE	12.56

Key Themes for Goal Four

Key Theme: Health and Nutrition "Scientists Create New Source of Vitamin D"

Brief description of the activity – There are very few sources of Vitamin D. Direct sunlight and cod liver oil are the two naturally occurring sources. In the 1930s, dairy scientists discovered a way to fortify milk, creating a third source of Vitamin D.

Today, the population of America is aging. Seniors drink less milk, and during winter months, spend less time in direct sunlight. As a result, their Vitamin D intake is greatly limited. Dairy Scientists at South Dakota State University have developed a method of fortifying process cheese with Vitamin D. Additional studies have confirmed that Vitamin D consumed in fortified cheese is absorbed during digestion. Questions still remain as to what amount of Vitamin D should be added to cheese, and how much of the fortified cheese needs to be consumed in order to meet the Recommended Daily Allowance of Vitamin D.

Short impact statement – Because of this important research, a third food – cheese – is now available to deliver Vitamin D in the human diet.

Source of Funds
Hatch Act
State Funds

Scope of impact, identifying which of the following apply to the activities conducted
(1) State Specific

Key Theme: Health and Nutrition "New Uses for Native Plants"

Brief description of the activity – Plants that are native to the Northern Plains were an important food source in the traditional Native American culture. However, as Native Americans were resettled on reservations, their diets changed to reflect food more commonly eaten by white settlers. While the Native American diet has changed, their understanding of traditional uses of these plants has been carried forward from generation to generation. Today, reservations occupy 20 percent of the land in North and South Dakota, and contain about seven percent of the regions total population. These reservations are among the poorest in the United States, with high levels of unemployment, diabetes, drug addiction and fetal alcohol syndrome. South Dakota State University has studied the agronomic, horticultural and pharmaceutical potential of plants native to the Northern Great Plains. The information has been assembled into an extensive ethnobotanical database covering traditional, modern and potential uses of the plants, their horticultural requirements, and modern agronomic methods for their utilization. The program is based on the Permaculture philosophy, involving a strategy to heal the earth while allowing man and nature to coexist with neither suffering from unmet needs. It preserves traditional Native American values and culture. SDSU scientists, collaborating with Native American leaders, have studied traditional Native American uses of plants, documenting the empirical knowledge of Native American peoples and incorporating this information into the standard western ethnobotanical knowledge base.

Short impact statement – As the nutritional, pharmaceutical and agronomic properties of native plants are documented, new niche markets are developing for urban consumers. Plants that were once an integral part of the Native American diet are finding renewed demand, becoming useful crop species for organic farms in the region.

For example, marketable products from the Echinacea plant have been developed on commercial farms in South Dakota. Scientists, working with Native American leaders, have rediscovered native plant species that produce flavorful teas containing antioxidant levels that rival green tea. The tea is already widely used on the region's reservations, and are being expanded to the greater public via direct marketing.

Source of Funds
Hatch
State Funds

Scope of impact, identifying which of the following apply to the activities conducted
(1) State Specific

Key Theme: Health and Nutrition "On Call Medical Television Program"

Brief description of the activity – Medical care is becoming more and more expensive. And, in rural states like South Dakota, access to a medical doctor may involve several hours of travel. These are just a few of the reasons that improved access to rural medical care has been a growing concern among Extension stakeholders in South Dakota. The SDSU Cooperative Extension Service, in cooperation with the South Dakota State Medical Association, South Dakota Department of Health, and South Dakota Public Broadcasting, initiated a weekly television program about medicine titled On Call. The program is co-hosted by a practicing family care physician, who is also a past president of the state medical association. Nearly every major health care entity in South Dakota either endorses or financially sponsors the program. Each week, the program focuses on a specific health issue and features primary care physicians and medical specialists from across the state and nation. One program featured South Dakota native Dr. Julie Gerberding, who is currently the Director of the Centers for Disease Control and Prevention. Topics covered in the first year of the program included: West Nile Virus and Epidemics, Colon Cancer, Alcoholism and Addiction, Stroke, Depression, Diabetes, Farmers Lung, Acid Reflux, the Flu, Asthma, Parkinson's Disease, Joint Replacement, and Allergies.

Short impact statement - While the On Call program is just becoming established with viewers, physicians across South Dakota are reporting that their patients are watching the program. Viewers are not only learning more about how they can care for family members with an illness, but also are learning about their personal medical issues. As a result, doctors say their viewer/patients have been better informed about their health situation when they schedule an appointment. Here are just a few examples of how On Call is providing medical information to television viewers:

One physician described an elderly patient who, just hours before, had undergone colon surgery. Although still recovering from the anesthetic, the groggy patient described the On Call program and understood the role of pain management in her recovery. The patient told her doctor she was experiencing discomfort and asked for something for the pain. "But," she said "I know you can't take the pain away completely. I watched the TV show." She went on to explain how monitoring pain helps a physician track the patients recovery after surgery.

In another case, a viewer contacted the host to request a copy of the On Call program on Alcoholism. After watching the broadcast, the viewer felt it was information his wife desperately needed. The caller's wife would drink and be gone for several days at a time. As a result, the couple had separated. The caller felt the ideas presented in the program, and possibly the program itself, could be the foundation for an intervention tool for his wife. On Call staff also referred him to his physician, and to ALANON and/or Alcoholics Anonymous.

A nurse working at a South Dakota manufacturing company has started a video tape library of each program. She uses the programs as a reference for company employees who may stop by her office with medical questions. Depending on their questions, she provides her copy of the program along with additional educational materials, and encourages them to seek further medical information from their personal physician.

On Call produced a special program on Alzheimer's Disease in cooperation with a PBS special "The Forgetting." This was one of the most watched On Call programs to date, generating more viewer phone calls than most other programs on South Dakota Public Television. The On Call television program has quickly become a valued source of medical information for the people of South Dakota.

Source of Funds
Underwriter funds

Scope of impact, identifying which of the following apply to the activities conducted
(1) State Specific

Goal 5: Protect and Enhance the Nation's Natural Resource Base and Environment. *(Previously Goal 4: Greater harmony between agriculture and the environment.)*

1862 Research - X
1862 Extension – X

Program Description: Greater harmony between agriculture and the environment.

Overview:
The SDSU Cooperative Extension Service and Agricultural Experiment Station work jointly to foster and support greater harmony between nature and the environment. This is accomplished by: 1) creating livestock housing and management practices that are environmentally sound, 2) identifying appropriate pesticide uses that preserve natural resources while enhancing agricultural production, 3) monitoring the quality of South Dakota's water; and, 4) assuring that fish, wildlife and agricultural production can co-exist. The Cooperative Extension Service and Agricultural Experiment Station have achieved a number of results in support of the goals listed above. These include:

Program: Wildlife Management

Output: SDSU works closely with state and federal wildlife agencies study wildlife in the region, and provide science-based information to assist in wildlife management. Two programs include efforts to better understand the mountain lion and Merriam's wild turkey. These studies document the survival rate, reproduction and range of both species.
Outcome: Wildlife managers now have a better understanding not only of the range of these animals, but also the factors that influence their survival. In addition, scientific observation has documented how these two species co-exist with humans and domestic animals.
Impact: Both species live primarily in the Black Hills of South Dakota. As more humans and domestic animals move into this scenic area, wildlife managers now understand how to help wildlife co-exist. In addition, the growing population of wild turkeys offers additional recreational opportunities to the region for hunters and game observers.

Program: Natural Resource Management

Output: From open pit mines, to streams and lakes, South Dakota's natural resources are vulnerable to pollution. SDSU has worked not only to identify sources of pollution in water, but also help land managers repair environmental damage from years of mining.
Outcome: Working with state and federal agencies, SDSU scientists have developed a set of measures to determine if water problems are developing. Using DNA fingerprinting technology, SDSU can identify the specific source of water pollution. In addition, SDSU assisted the federal government in the development of a reclamation plan for the largest open pit gold mine in the state.
Impact: When water pollution does occur, SDSU testing procedures are now available to help identify the specific source, allowing clean-up treatments to be targeted to the actual problem. In the case of the Gilt Edge Mine, the source was apparent. The highly contaminated open pit mine has now been converted to a pristine forest meadow with more than 30 inches of topsoil.

Assessment:

The programs of the Cooperative Extension Service and Agricultural Experiment Station have helped producers be good stewards of the state’s natural resources, while at the same time strengthen the potential for agricultural profitability in South Dakota. Livestock waste management programs of the Cooperative Extension Service have helped producers understand the various permits required for livestock production, as well as facility design and location, combined with proper feeding can help minimize the impacts of livestock concentrations on the environment. Agricultural Experiment Station scientists have further defined how wildlife and agriculture can co-exist. SDSU Analytical Service Labs help producers determine soil fertility and available plant nutrients, and water quality, leading to greater understanding and management of agricultural chemicals in the environment. Extension specialists and educators, and AES scientists have developed multi-state and interdisciplinary relationships that allow them to share new knowledge, and utilize the strengths of each entity for the overall benefit of stakeholders. The following Key Themes offer greater detail.

GOAL FIVE FUND SUMMARY
Total Expenditures by Source of Funds

Hatch	196,897
State Match	201,275
FTE	36.6
Smith Lever	239,023
State Match	325,970
FTE	13.92

Key Themes for Goal Five

Key Theme: Wildlife Management "Mountain Lion Survival"

Brief description of the activity – Mountain lions were placed on the South Dakota list of threatened species in 1978. But in the past 25 years, sightings of the big cat have increased substantially. The animals live primarily in the Black Hills of South Dakota, an area becoming more populated by people and by other wildlife. Because mountain lions can potentially harm humans, livestock and domestic pets, and feed on deer, the South Dakota Department of Game, Fish and Parks needed to develop a science-based Mountain Lion Action Plan. The South Dakota Department of Game, Fish and Parks asked South Dakota State University to determine the amount of area each mountain lion needs, and how the animals space themselves relative to each other.

The information would determine how many mountain lions can live in the Black Hills. Mapping favored habitats of the mountain lion could also assist potential cabin owners in selecting safe vacation sites. The five year SDSU study, conducted by a student working toward a doctorate in biological sciences, determined that there are 40 to 50 male and female mountain lions in the Black Hills. That is nearly double of a previous estimate.

Short impact statement - The study revealed that a mountain lion, however strong or feared it may be, is often in mortal danger itself, both from humans and from its own kind. An astonishing 58 percent of the 12 mountain lions studied either died or disappeared during the course of the project. One died from a fight with another mountain lion. The others died as a result of an arson-related forest fire, or from gunshot wounds. The SDSU study determined that male mountain lions can have a home range of up to 400 square miles, and females can have a range of up to 150 miles. The study also resulted in a credible estimate of the size of the mountain lion population, information on the territoriality and animal spacing in the Black Hills region, and information on animal condition. This study will give wildlife managers information needed to assure that mountain lions, people and other wildlife can live together in relative harmony.

Summary of Funding
Hatch Act
State

Scope of impact, identifying which of the following apply to the activities conducted
(1) State Specific

Key Theme: Wildlife Management "Turkey Management"

Brief description of the activity – Merriam's wild turkeys were introduced in the Black Hills in 1948. They are hunted intensively on private and public lands in the southern Black Hills, yet little is known about their movements, habitat selection, survival and reproduction. And because the turkeys live in forest and grazing meadows, efforts to enhance turkey survival rates will also influence timber cutting procedures, grazing and other events that provide economic support to the region. South Dakota State University embarked on a five year study of the survival rates, habitat use and farmstead dependence of Merriam's wild turkeys. One important question was whether the turkeys were truly living wild in forest areas, or were relying on food supplies available on farms. The study found high survival rates for turkeys wintering on farmsteads, and also for turkeys wintering in forests. However, during spring nesting season, females that wintered on farmsteads had lower nest success, lower renesting rates, and lower survival rates than forest wintering females.

Short impact statement - Landowners and wildlife managers now have science-based information available regarding the annual and seasonal survival of Merriam's wild turkeys in the southern Black Hills. Wildlife managers can now predict the annual production of new birds. Private landowners and U.S. Forest Service staff can now select for timber cutting and grazing procedures that will provide positive benefits for the turkeys where optimal nesting, brook rearing or other habitat is lacking. If the population of Merriam's turkeys continues to grow, it will bring additional recreational opportunities to the region, offering further support to the local economy.

Source of Funding
Hatch Act
McIntire-Stennis Cooperative Forestry
State – State Funds

Scope of impact, identifying which of the following apply to the activities conducted
(1) State Specific

Key Theme: Natural Resource Management "Gilt Edge Mine Restoration"

Brief description of the activity – The Gilt Edge Mine was one of the largest open pit gold mines in the Black Hills. When its parent corporation declared bankruptcy and left South Dakota, the corporate bond was insufficient to clean-up the heap leaching facility. This process generated acid and cyanide. The surrounding Black Hills streams and land was contaminated these chemicals, as well as arsenic. The abandoned mine was an environmental disaster, and became an EPA Superfund site. Plant scientists at South Dakota State University developed a reclamation plan for the Gilt Edge Mine. Over a period of six years, the heap leech facility was capped, and a drain system was installed under and around the pile. The open pit mine was regraded to a slope of 3.5 to 1, and top soil was reconstructed. Because the Black Hills does not have much top soil, one of the goals of this project was to develop enough top soil to support a forest meadow.

Short impact statement - Today, the 70 acres which had previously been a highly contaminated open pit mine is now a forest meadow with more than 30 inches of top soil. The harmful chemicals have been either removed or permanently contained, and the land used for the open pit mine has been stabilized. Because of the cost of reclamation, the site of the Gilt Edge Mine is now the most expensive real estate in South Dakota.

Source of Funding
Hatch Act
State

Scope of impact, identifying which of the following apply to the activities conducted
(1) State Specific

Key Theme: Natural Resource Management "Science Traces Source of Water Pollution"

Brief description of the activity – biological and chemical integrity of the nation's waters. States were required to file bi-annual reports. Because there was no standard monitoring tool for biological data, and because of a lack of resources, South Dakota has not been able to comply with this reporting requirement. Scientists at South Dakota State University worked with state and federal agencies that manage natural resources to define the regional characteristics of aquatic biota. Streams and lakes were samples to determine specific types of problems, including movement of topsoil into water, chloroform bacterial contamination, and nutrient enrichment. This was done in an effort to develop biological markers that would signal environmental problems, leading to shifts in water quality. SDSU established a set of measures to determine if water problems were developing. Using DNA fingerprinting technology, SDSU collected samples from ten animal species that may cause fecal chloroform bacterial contamination in water sources. Combined with antibiotic profiles for each species, scientists can compare samples of contaminated water with control samples to trace problems to the actual source of contamination.

Short impact statement - For the first time in nearly 30 years, South Dakota now has the technology to monitor and report water quality measures to the federal government. Because of this technology, specific sources of water contamination can be identified, and clean-up treatments can be targeted to the actual problem.

Source of Funding
Hatch Act
Smith-Lever 3(b) & (c)
State

Scope of impact, identifying which of the following apply to the activities conducted
(1) State Specific

Stakeholder Input Process

A. Actions taken to seek stakeholder input that encourages their participation.
A key component of the FY 2000-2004 Plan of Work called for the South Dakota State University College of Agriculture and Biological Sciences to solicit formal stakeholder input in many forms, from many sources, and at many locations. Methods of inviting stakeholder input included meetings or other communication with: Agricultural Experiment Station Research Farm Advisory Boards; Research Review Meetings with agricultural check-off groups including the South Dakota Soybean Research and Promotion Council, South Dakota Corn Utilization Council, South Dakota Beef Industry Council, South Dakota Oilseeds Council, South Dakota Pork Producers Council, South Dakota Wheat Commission, and others.

Input was also sought out from state agricultural commodity groups including Ag Unity, the South Dakota Pork Alliance, the South Dakota Stockgrowers/Cattlewomen, and the South Dakota Veterinary Medical Association; and from meetings with organizations that fund research such as the National Institutes of Health, U.S. Department of Energy, National Science Foundation, NASA, Environmental Protection Agency, and the National Centers for Disease Control and Prevention. In addition, stakeholder input was solicited from governmental agencies, including: the Office of the Governor, the South Dakota Department of Agriculture, South Dakota Department of Environment and Natural Resources, South Dakota Game, Fish and Parks, South Dakota Department of Education and Cultural Affairs, Office of the State Veterinarian, Social Services, Job Service, National Agricultural Statistics Service, 1994 Institutions, and others.

In addition, stakeholder input was sought at SDSU field day tours; SDSU agricultural meetings; Community Leader Meetings throughout the state; meetings with the South Dakota Board of Regents, South Dakota Legislature, and other elected officials and boards; and events open to the public such as the South Dakota State Fair and DakotaFest. Additional input was solicited during comprehensive CSREES Departmental and Institutional Reviews, which span teaching, research and Extension activities.

Stakeholder input specifically for projects involving McIntire-Stennis funds was sought from the South Dakota Nurseryman's Association, the South Dakota Parks and Recreation Association, the U.S. Forest Service, and also from special project-oriented groups like the Mortensen Group. This group works specifically on the Mortensen Ranch project, and includes NRCS, local RC&D groups, and other local entities.

County Extension Advisory Boards are required by South Dakota law, and provide citizen input, guidance, and direction for county programming that target priority needs and issues, and are appointed by County Commissioners. Membership on this board is required by state statute to represent the racial population mix of the county and of the various interest groups served by Extension.

The State Extension Advisory Board provides guidance and direction to the Cooperative Extension Service, and informally to the Agricultural Experiment Station. Members of this board are elected from each County Extension Advisory Board, and the 1994 land grant institutions.

On-going Stakeholder Input is often sought during special planning meetings. For example, the Sun Grant Initiative planning meeting in August 2002 sought valuable feedback from groups representing energy development, community development, regional land grant scientists and Extension leaders, and other issue-oriented stakeholders.

B. Process used to identify individuals and groups who are stakeholders and to collect input.

While the existing channels of stakeholder input remained constant, South Dakota State University's College of Agriculture and Biological Sciences has expanded its stakeholder input procedure for this planning period, enhancing the opportunities for South Dakotans to offer suggestions and requests for research and educational programs. The expanded stakeholder input process relied heavily on the five year Cooperative Extension Service assessment planning data.

The revised system allowed stakeholder input to be directed across the broad scope of the College of Agriculture and Biological Sciences and to activities supported by Smith Lever, Hatch, McIntire-Stennis, and other funds. Stakeholder input was not directed exclusively to the Cooperative Extension Service or Agricultural Experiment Station. The multidisciplinary input system used a variety of techniques that included: direct input, brainstorming, surveys and questionnaires, nominal group technique and other appropriate methods.

An important change during this planning period was the establishment of 13 Field Education Units representing all parts of South Dakota. Each unit is comprised of 1 to 9 counties. A 14th on-campus stakeholders' input session was dedicated to soliciting input from SDSU students, faculty and other Regental constituents. Stakeholders from each

Field Education Unit across the entire state were identified, with care given to include any group or audience that may be or previously have been underrepresented or underserved. An invitation was issued inviting representatives from each of the identified stakeholder groups to participate in the program review and development planning session. A series of general news releases was issued inviting all citizens to participate in the process, even though they may not have been directly contacted.

The missions of County Extension Advisory Boards and State Extension Advisory Board continued, and three new advisory boards were created, including:

Field Education Unit Advisory Boards – these provide guidance and direction for multi-county educational programs, and are elected to represent County Extension Advisory Boards.

State-Wide, Long Range Planning Board – this board solicits and coordinates input from multiple, statewide constituencies to ensure that state priorities and goals are being addressed through the Cooperative Extension Service. Members are appointed by the President of South Dakota State University.

Campus Resource Council – this board identifies SDSU resources available to the Cooperative Extension Service, coordinates program delivery and provides efficient access to educational expertise and opportunities. Members are appointed jointly by the SDSU Vice President of Academic Affairs, Director of the Cooperative Extension Service, and Dean of the College of Agriculture and Biological Sciences. It includes representatives from SDSU academic colleges and other campus units.

C. How collected input was considered.
Administrators evaluated all requests and comments from stakeholders to determine if clear patterns of needs exist, and if resources can be directed to the client requests. CES educators, specialists, and AES scientists actively sought out input to insure that research and education programs are fine-tuned to the current needs of stakeholders.

Program Review Process

There have been no significant changes to the program review process, as described in the current Integrated Five-Year Plan of Work for South Dakota.

Evaluation of the Success of Multi and Joint Activities

During the planning period covered by this report, the SDSU Cooperative Extension Service, working closely with the South Dakota Agricultural Experiment Station, changed its program planning methodology for all five goal areas to enhance South Dakota State University's focus on stakeholder input. This change is outlined in great detail in the Stakeholder Input section of the Plan of Work.

During Spring 2000, Needs Assessment Meetings were held in each of the 13 South Dakota Field Education Units. These meetings facilitated stakeholder input from all audiences, including those which may have been previously underserved. The result of the meetings were a series of recommendations for key programs for each of the five goal areas. These recommendations were reported by individual Field Education Unit, but in many cases, the programs requested were in statewide demand.

Based on stakeholder input, programs were developed to fulfill the "multi-philosophy." Many of the programs included of the following components: multi-state, multi-discipline, multi-functional, or multi-institutional approaches. To the greatest extent possible, specific programming relationships with the 1994 Institutions in South Dakota were either strengthened, or initiated if none existed in the requested programming areas. The "multi-philosophy" enhanced the efficiency of program delivery. It also enhanced client access to new ideas and concepts.

Funds were targeted to programs that included a "multi" component and addresses specific outcomes and impacts, as requested by stakeholders during the Needs Assessment Meetings and from outer sources of input.

Ultimately, these programs did address the critical issues of strategic importance, as identified by the stakeholders, including those which may have been underserved or underrepresented.

Multistate Extension Activities

Multi-State Extension Activities

Title of Planned Program/Activity	Actual Expenditures for FY 2003
Goal 1	94,695
Goal 2	77,457
Goal 3	40,165
Goal 4	34,424
Goal 5	37,457

Summary of Multi-State Extension Activities

The South Dakota Cooperative Extension Service works closely with other states to provide educational programs. Examples of programs include: Coordinated innovative education on Soybean Cyst Nematode in the North Central Region, Coordinated Resource Management, the Midwest Plan Service, Integrated control of white mold of soybeans in the North Central States, Soil and Plant Analysis Methods and Interpretation for Nutrition Management, National Fusarium head blight initiative – chemical and biological control, Pork Industry Handbook, the Range Beef Cow Symposium, Bootstraps, the National AgrAbility Project, the Sun Grant Initiative, and the *Today's Ag* television program.

Additional programs include: The Dairy Forage Conference, the South Dakota Dairy Association and Dairy Fieldmen's Convention, 10-state FNP Marketing Committee, Tri-State Child Care Providers Conference, North Central Cheese Industry Association, Water Quality Resource Strategy and Coordination, Dakota Ram Performance Test, AKSARBEN Youth Livestock Show, the Tri-State 4-H Leader's Forum, Purple Loosestrife Management Committee, and the Four Plains States Conferencing Program Evaluation.

Other programs include: the Pipestone Lamb and Wool Program, Tri-State Fertilizer Work Group, Agvise Soil Testing Advisory Board, European Corn Borer Moth Flight Tracking Project, Area Drainage Conference, Canola Regional Variety Trials, Flax Regional Variety Trials, and the Ag Engineering & Industry Training Symposiums.

In addition, there are many informal cooperative programs with other states that help extend educational information to stakeholders. These programs exist on the county and state level.

Integrated Research and Extension Activities

Integrated Activities (Hatch Act Funds)

Title of Planned Program/Activity	Actual Expenditures for FY 2003
Goal 1	471,861
Goal 2	32,407
Goal 3	15,643
Goal 4	20,331
Goal 5	41,011

Integrated Activities (Smith Lever Act Funds)

Title of Planned Program/Activity	Actual Expenditures for FY 2003
Goal 1	268,256
Goal 2	213,027
Goal 3	110,458
Goal 4	94,679
Goal 5	102,569

Summary of Integrated Activities

The Cooperative Extension Service and Agricultural Experiment Station at South Dakota State University's College of Agriculture and Biological Sciences collaborate to develop new knowledge, and distribute it to the people of South Dakota, the region and the nation. SDSU follows the traditional land grant model in that the AES is primarily responsible for the development of new knowledge; CES is primarily responsible for dissemination and application of the knowledge, and Academic Programs are primarily responsible for undergraduate and graduate education. These three entities have specific missions, yet coordinate efforts to maximize resources and address stakeholder needs. Whereas AES and CES efforts are integrated, one entity often takes the lead role.

In Goal One, the Agricultural Experiment Station crop programs in Breeding, Genetics, and Molecular Biology; as well as Plant Physiology and Nutrition; and Alternative Crop Enterprises, provide information and research linkages to Cooperative Extension Service programs in Crop Management, Disease Control and Pest Management; as well as Integrated Management of Livestock, Crop and Conservation Systems. Similarly in livestock, AES programs in Breeding, Genetics and Molecular Genetics; and Forage/Range Management provide information and research linkages to CES programs in Livestock Management, Alternative Livestock Enterprises, and Food Safety and Structures.

In Goal Two, AES programs in Renewable Energy; Human Stress; Population and Human Health; Marketing and Decision Making Data; and Seed Marketability and Control provide information and research linkages to CES programs in Community Planning and Economic Development; Human Resource Development; Leadership Development; Youth Development and 4-H; Resource Management; Strengthening Family Relationship and Roles; and, Communication Systems and Technology.

In Goal Three, AES programs in Pesticide Use Standards; Transgenic Food Safety; Food Quality and Ag Product Marketing Systems provide information and research linkages to CES programs in Food Safety, Preservation and Training; and, Pesticide and Livestock Waste Management.

In Goal Four, AES programs in Nutrition and Food Science; Food Product Development; and, Consumer Research, provide information and research linkages to CES programs in Diet and Nutrition; EFNEP and FNP; Consumerism and Human Health.

In Goal Five, AES programs in Environmental Impact of Chemical/Fertilizer Management; Water Movement; Wildlife and Fisheries Management; Wetland, Forest, Prairie and Riparian Research; and Analytical Services testing of soils, water and plants provide information and research linkages to CES programs in Precision Farming; Pesticide and Fertilizer Use and Management; Livestock Waste; and Water Quality.

In addition, the Stakeholder Input process solicits information for the Cooperative Extension Service and Agricultural Experiment Station. These two agencies truly provide integrated services to South Dakotans.