PLAN OF WORK

Annual Report

SOUTH DAKOTA STATE UNIVERSITY
Federal Fiscal Year 2006
October 1, 2005 - September 30, 2006

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 an estimated 775,933 people (2005 Census Estimate). One-third of the population is found in the two largest counties, and 44 percent of the population is found in the five largest counties. The largest counties also have the most active growth in population, income and economic development. Minnehaha County alone has 20 percent of the state's population. Lincoln County is ranked as the fifth fastest growing county in the nation. The remaining 60 counties have lower levels of population growth, and pervasive levels of poverty. Poverty is particularly high on the Native American reservations in the state.

Historically, between 12 and 16 percent of South Dakota's population ranks below the poverty level, and in 2003 the number was estimated to be 12.3 percent. The U.S. Department of Agriculture's Economic Research Service reports that in 2003, the average annual income in South Dakota was $28,856. Statewide unemployment is consistently in the three to four percent range, and was at 3.5 percent in 2004. 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 each wage earner holds 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 eight Native American reservations. The Native American population represents approximately 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. Five of the ten poorest counties in the nation are in South Dakota, meaning that poverty is not just a problem in reservation counties. Unemployment, alcoholism, poor diet, obesity, diabetes and other health and social problems are prevalent in reservation areas with high poverty rates.

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. Seventy-four percent of all farms earn less than $100,000 per year, while 24% earn between $100,000 and $499,999 each year. Two 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 31,600 farms with an average size of 1,386 acres.

The Northern Great Plains was known as the Great American Desert during the 19th Century. Numerous types of abiotic, biotic and social stresses continue 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.

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, and Extension specialists, are also located at the SDSU West River Ag Center at Rapid City. The West River Center serves as the primary host for integrated CES and AES programs west of the Missouri River. Research project leaders are also located at the Dakota Lakes Research Farm near Pierre, in central South Dakota, and at the Southeast South Dakota Research Farm near Beresford. Both of these research farms also feature strong Extension educational components. Both 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. AES and CES staff work cooperatively to offer educational field days at each station.

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 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, interpretation of AES research, and helping to transfer information from the scientist to the agricultural user. Each year, more than 40,000 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 63 South Dakota Counties and two Native American Reservations. An individual Memorandum of Agreement with each county 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 2006, 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 2006 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 science-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: Risk Management
Program description: SDSU offered a series risk management programs for commodity producers in 2006. These programs focused on pricing and forward contracting of agricultural commodities, assistance in evaluating alternative production practices required due to the extended drought, and corn pricing opportunities which grew from the expanding ethanol market. These programs featured science-based information from the disciplines of economics, animal science, plant science, dairy science and veterinary science. Agricultural Experiment Station economists monitored major economic trends in production agriculture and related fields to give SDSU Extension economists an analysis of trends and opportunities which may off-set risk.

Critical issues addressed by the program: The SDSU risk management program addressed two statewide issues: 1) Adverse weather conditions. Nearly two-thirds of the state has experienced severe drought for several years. 2) Price and price volatility. Weather, the growing ethanol industry in South Dakota, combined with national and international market trends, have created price volatility which may translate to price opportunity for producers who understand how to manage risk.

Underserved/underrepresented populations: The section of this report titled "Stakeholder Input Process" describes in detail how the SDSU College of Agriculture and Biological Sciences seeks input from citizens, including underserved and underrepresented populations when determining the educational programs to be offered. The development of risk management programs reflect SDSU's commitment to serving the needs of all

South Dakotans, and are a part of the statewide needs assessment and program development process.

Each county actively participates in the program planning process. County Extension Advisory Boards are required by South Dakota law, and provide citizen input, guidance and direction for county programming that targets priority needs and issues. County Extension Advisory Board members are appointed by elected County Commissioners. State Statute requires that membership on the County Extension Advisory Boards represents the racial population mix of the county, and of the various special needs groups in the county. With the active support of college, Extension and research administrators, County Extension Educators regularly monitor local needs and issues. Educators report these needs to Area of Emphasis discipline councils and state administrators.

Research and educational programs dealing with risk management are available to all agricultural producers. Because South Dakota has a growing Hispanic population, SDSU has started to release targeted Extension materials in Spanish.

This program included Integrated, Multi-state Research and Extension components:
Multi-State Research – participating states included: South Dakota and North Dakota NC-1014 and SCC-76 are both multi-state projects with active participation by SDSU. Various insurance products have been examined and evaluated for their appropriateness at managing risk in South Dakota. NC-1014 is also integrated.

Multi-State Extension – participating states included: South Dakota, North Dakota, Wyoming and Montana.

Source of funds
_X__ Hatch
_X__ Smith-Lever
_X__ State
_X__ Other – federal grants

Output of this program: SDSU conducted research and offered Extension programs that assist farmers and ranchers in improving their risk management skills. Information was presented in peer-reviewed Extension publications, research papers presented at regional and national meetings, and seminars presented at Extension workshops which were open to the general public.

Outcome of this program: Producer understanding of risk management options grew, and some the actions of some producers indicates that the educational programs are assisting them to make informed decisions. In one important example, the demand for corn grows substantially as each new ethanol plant is brought into production. Today, South Dakota corn producers understand how to market their corn to ethanol plants. For every three rows of corn harvested in South Dakota, producers sell two rows of corn to ethanol plants.

Impact of this program: Follow-up surveys with producers have identified three important trends: 1) producers continue to seek out information similar to what was presented in earlier Extension workshops; 2) producers report changes in their commodity marketing practices, reflecting the recommendations presented at earlier Extension workshops, and 3) producer income has increased as risk management recommendations are implemented.

Assessment: This statewide program addressed the targeted critical issues, as best indicated by individual producer case studies. Corn prices increased late in 2006. SDSU delivered fundamental risk management information on price patterns at harvest time. One producer reported that he changed his delivery pattern and supplied a different buyer with grain, thereby increasing profits.

Dry conditions have led producers to seek alternative production practices to cope with reduced locally produced feedstuffs. SDSU researchers studied how early weaning may affect feedlot performance and documented how returns would be affected. As a result, producers are now given updated information on how performance can be enhanced under high cost scenarios. For producers in the drought areas of central and western South Dakota, this information has helped determine whether to keep or sell their foundation herd.

Forward contracting of livestock has producers concerned about the competitiveness of prices received. SDSU researchers examined different aspects of mandatory price reporting, which contains information on contracting livestock. The forward bid information was then shared at producer workshops. Producers then used the information to evaluate bids and improve their returns.

As fossil fuel prices soar, ethanol plants are being built across the Corn Belt. Corn producers are seeing increased prices for their commodity, but have ethanol-specific questions regarding marketing and delivery. SDSU economists studied the rapidly developing ethanol market and availability of corn/biomass for these plants. They found that the demand for corn for ethanol has narrowed the corn basis for locations in Eastern South Dakota by 20 to 25 cents per bushel. The economic impact of ethanol development on the South Dakota economy changes (increases) with every new plant coming on line. The biomass availability study has information that indicates plenty of biomass available, but high cost of harvest, handling, transport, nutrient replacement, make corn production for ethanol not feasible in some parts of the state. Economists indicate that it may take $35/ton biomass for ethanol production in all parts of the state to be feasible. Producers cannot delivery corn/biomass in sufficient quantities for under $50/ ton. New tech will develop and make this feasible as better accumulation and transprort is made available.

Program: Crop Systems

Program description: SDSU crop programs take a systems approach to crop management and food production. These education and research efforts are led by the SDSU Plant Science Department, which is offers programs in three general discipline areas: soil science, crops science and pest management which includes entomology, plant pathology and weed science.

Critical issues addressed by the program: The Crop Systems program addressed three issues associated with crop growing conditions, including: 1) Crop variety research and development; 2) Pest control and prevention; and, 3) Crop management practices.

Underserved/underrepresented populations: The section of this report titled "Stakeholder Input Process" describes in detail how the SDSU College of Agriculture and Biological Sciences seeks input from citizens, including underserved and underrepresented populations when determining the educational programs to be offered. Each county actively participates in the program planning process. County Extension Advisory Boards are required by South Dakota law, and provide citizen input, guidance and direction for county programming that targets priority needs and issues. County Extension Advisory Board members are appointed by elected County Commissioners. State Statute requires that membership on the County Extension Advisory Boards represents the racial population mix of the county, and of the various special needs groups in the county. With the active support of college, Extension and research administrators, County Extension Educators regularly monitor local needs and issues. Educators report these needs to Area of Emphasis discipline councils and state administrators.

During summer growing conditions, SDSU Plant Scientists and SDSU Extension agronomy educators participate in a weekly statewide teleconference to monitor crop conditions, and evaluate whether targeted information is needed for certain parts of the state. SDSU crop systems information is available to all producers through the County Extension Office, and on numerous mass media channels including radio, newspaper and the internet.

An Extension Agronomy Educator is based in Dewey County, and works closely with the Cheyenne River Sioux Tribe.

This program included State Specific, Multi-State Research and Extension, and Integrated Research and Extension Components.
Multi-State Research – participating states included: SD, ND, MN, IA, NE, KS, IL, IN, WI, MI, KY, MD, MO, OH, TN, and several provinces in Canada.

Multi-State Extension – participating states included: SD, ND, MN, IA, NE, KS, OK, IL, IN, WI, MI.

Source of funds
_X_ Hatch
_X_ Smith-Lever
_X_ State
_X_ Other

Output of this program:

a. Research: The Plant Science Department has active research programs in precision agriculture, plant breeding and genetics, natural history, soil fertility, and pest management. All of these programs have collaborations within the College of Agriculture and throughout the University. Specifically, the soybean, oilseeds, spring wheat, winter wheat and oat breeding programs have resulted in the release of new varieties adapted to South Dakota conditions.
b. Teaching: The Plant Science Department trains both undergraduate (Agronomy with 4 areas of specialization including; Business, Pest Management, Production and Science) and graduate (M.S. and Ph.D. in Agronomy or Biological Sciences) students.
c. Extension: Extension Specialists provide research-based information and recommendations to Extension Educators and South Dakota producers.

Outcome of this program:

a. Forages: 1999-2006 Alfalfa Variety results http://plantsci.sdstate.edu/forages/Alfalfa%20Trials/SD_Alfalfa_Trials.html provide growers with variety performance and yield data to help in decision making regarding cultivar choice. Switchgrass and cordgrass germplasms are being evaluated for potential bioenergy uses.
b. Winter Wheat Breeding Program: Annual reports (1994-2006) http://plantsci.sdstate.edu/triticum/Reports.htm provide varietal and breeding line performances. Eight varieties have been released since 1994 including two winter wheat varieties in 2006, cv. 'Alice' and 'Darrell'.
c. Soil Fertility: Research reports (1996- 2005) http://plantsci.sdstate.edu/woodardh/soilfert/ provide searchable recommendations and guidelines for major crops, farming practices and nutrients.
d. Plant Disease Program: Provides wheat and barley scab risk advisory http://plantsci.sdstate.edu/smallgrainspath/scab_advisory/index.html, soybean rust advisory, soybean cyst nematode sampling, and management information for major South Dakota crops.

Impact of this program

a. Producers choose alfalfa varieties that are improved with pest resistance, adapted to South Dakota environmental conditions and provide the best yield for the locale. Promising switchgrass and cordgrass lines are being developed.

b. Winter wheat breeding program continues to develop improved varieties with pest resistance, yield and quality potential and adaptation to South Dakota.
c. A Best Management Practice module for South Dakota corn is being developed that will provide growers with pest, nutrient, irrigation and other production practice recommendations.
d. Plant Disease program continues to provide head scab warnings for wheat and barley, monitor through sentinel planning for Asian soybean rust and continues to provide soybean cyst nematode monitoring through the Plant Disease Clinic.

Assessment:

a. Crop Performance Testing program provides growers with regional adaptation information and variety performance to aid them in making decisions about cultivars. Approximately 75 cultivars and elite lines were planted at five South Dakota sites and evaluated for yield, quality and persistence.
b. South Dakota developed winter wheat varieties are planted on approximately 46% of the winter wheat acreage in the state. Spring wheat varieties developed at SDSU are planted on 42% of the state's spring wheat acreage.
c. The Plant Disease Clinic processed a total of 772 plant disease samples in 2006; 326 soybean samples, 116 forestry samples, 245 weekly leaf disease samples, and 67 soybean virus samples.

There is a constant need to improve cultivars of the crops grown in South Dakota to improve yield, quality, pest resistance and adaptation to production conditions within the state. New varieties have been developed by SDSU Winter Wheat Breeding Program (cv. Alice and Darrell) that have increased average yields by 1.17 and 2.5 bu/A (2005 data, across 12 locations). For example, if Darrell, a hard red winter wheat, supplanted Wesley the current leading variety (previous developed jointly by SD/NE/WY) has the potential to increase South Dakota producers wheat production by additional 1.3 million bushels of wheat, a value ($5/bu) of $6.5 million (2005 data).

Adoption of new cultivars can increase agricultural profitability and contribute to strengthening rural economies across the state.

Program: Livestock Systems

Program description: SDSU livestock systems extension and research programs are led jointly by the SDSU Department of Animal and Range Science, and the SDSU Department of Dairy Science. The dairy, beef cattle, swine and sheep programs focus on nutrition and seek to develop best management practices that assists producers to maintain sustainability and improve profitability.

Critical issues addressed by the program: Since the turn of the century, the ethanol industry in South Dakota has experienced exponential growth. As of January 1, 2007, there were fifteen ethanol plants either online or in various stages of development. Collectively, these fifteen plants will produce nearly one billion gallons of ethanol and three million tons of distillers co-products. The primary co-product produced, distillers grain, provides a concentrated source of energy, protein, and minerals for livestock. However, new ethanol production processes have resulted in the development of new co-product. Research was conducted to define how incorporation "traditional" distillers grains in the diets of dairy cattle, beef cattle, sheep, and swine affects animal growth and efficiency, nutrient excretion, and carcass characteristics. Cooperative Extension Service educators and specialists programs transferred new knowledge developed by Agricultural Experiment Station personnel to livestock producers, nutritionists, and veterinarians.

Underserved/underrepresented populations: The section of this report titled "Stakeholder Input Process" describes in detail how the SDSU College of Agriculture and Biological Sciences seeks input from citizens, including underserved and underrepresented populations when determining the educational programs to be offered. Each county actively participates in the program planning process. County Extension Advisory Boards are required by South Dakota law, and provide citizen input, guidance and direction for county programming that targets priority needs and issues. County Extension Advisory Board members are appointed by elected County Commissioners. State Statute requires that membership on the County Extension Advisory Boards represents the racial population mix of the county, and of the various special needs groups in the county. With the active support of college, Extension and research administrators, County Extension Educators regularly monitor local needs and issues. Educators report these needs to Area of Emphasis discipline councils and state administrators.

Research and educational programs dealing with dairy production are available to all agricultural producers. Because South Dakota has a growing Hispanic population working in the dairy industry, SDSU produced a series of Extension dairy production materials in Spanish.

An Extension Livestock Educator is based in Ziebach County, and works closely with the Cheyenne River Sioux Tribe. Another Extension Livestock Educator is based in Tripp County and works closely with the Federally Recognized Tribal Extension Program in Todd County.

This program included State Specific, Multi-State Research and Extension, and Integrated Research and Extension Components.
Multi-State Research – participating states included: SD, ND, MN, MT, WY, NE. Many of the dairy research programs were conducted under the auspices of the Midwest Dairy Foods Research Center. These efforts include: *NC 1119, management systems to improve the economic and environmental sustainability of dairy enterprises*. This project evaluated the impact of feeding distillers grains to calves and a study of feeding efficiencies. The project yielded 14 publications in 2006. *NC 1009, metabolic relationships in supply of nutrients for lactating cows*. This study quantified metabolic

interactions among nutrients that alter synthesis of milk from dairy cows. *W1181, modifying milk fat composition for improved nutritional and market value*. The purpose of this project is to improve the healthfulness of dairy products through cattle dietary strategies. Feeding strategies were developed to increase unsaturated fatty acids in milk. Participation in training on the use of DDGS and WDGS coordinated with other states multi-state: Hubbard employees (Waseca, MN), LOL employees (Lincoln, NE), Food Safety NDSU), and Hiring and training Hispanic employees (NDSU). SDSU also partnered with USDA-ARS, MBI to study the feeding of distillers grains to dairy cattle.

Multi-State Extension – participating states included: SD, ND, MN,

Source of funds
_X_ Hatch
_X_ Smith-Lever
_X_ State
_X_ Other

Output of this program
Dairy Science programs extend from the farm to product and ranged from development of nutritional information for dairy cattle management to development of dairy products through research. Cooperative Extension helped producers employ distillers grains in dairy cattle diets and improve milk quality. Products research on low fat cheeses and frozen desserts was designed for development of healthful and quality products.

Benson et al. conducted to determine the effect of increasing dietary concentrations of dried distillers grains plus solubles (DDGS) on phosphorus balance in finishing steers. Engel et al. evaluated the reproductive response and blood metabolite concentrations in beef heifers fed DDGS and soybean hulls during late gestation. The use of DDGS as a primary supplemental crude protein source in calf receiving diets was examined by Pritchard and Boggs. Melroe et al. investigated the effect of supplementing DDGS or corn on performance of cows grazing spring pasture during the breeding season. The effect of corn or soybean hull diets supplemented with DDGS on finishing lamb performance and carcass characteristics was investigated by Zelinsky et al. Zelinsky and Wertz-Lutz (a) examined the effects of increasing dietary energy density by replacing hay with soyhulls and DDGS on nutrient digestibility and rumen physiology. The effects of increasing the energy density of a lactating ewe diet by replacing hay with soyhulls and DDGS were investigated by Zelinsky and Wertz-Lutz (b). In addition to the research efforts, a series of six informational meetings were conducted across SD to address utilization of distillers co-products in the diets of beef cattle, dairy cattle, sheep, and swine. These meetings incorporated expertise of Cooperative Extension Educators and specialists.

Outcomes of this program
Feeding research showed that condensed corn distillers grains solubles altered the fatty acid composition of the milk produced that improved the healthfulness and marketability of milk fat. Changes include increased proportions of unsaturated fatty acids and

included increased proportions of conjugated linoleic acid and its precursor vaccenic acid. Some of these same dietary changes, especially when the diet included a small amount of fish oil, may increase the cow's immunity against disease. This and other research has demonstrated that there is increased potential for utilization of coproducts in diets. Small dairy farmers in Honduras have improved daily milk production by more than 15%, due to the assistance of SDSU Dairy Extension. Working through USAID's Farmer to Farmer Program, dairy extension taught hygienic milking practices, animal health and nutrition, and milk handling, testing, storage, and delivery in a nation that struggles with poor herd nutrition, milk storage problems, and contamination from mastitis. Dairy product research has demonstrated the applicability of vitamin D fortification of cheese for improving the nutritional value of dairy products. The use of exopolysaccharide (EPS)-producing cultures in making base Cheddar cheese allowed the utilization of more young cheeses in making process cheese. The texture of reduced fat process cheese may be improved by using EPS-positive base cheese. The acquisition of a new microfiltration unit enhanced capabilities for future activities in cutting edge research in dairy processing.

Benson et al. determined that, when DDGS is included in the diets of finishing steers at 12, 24, or 36% of the diet dry matter, phosphorus excretion increases by 6.9, 45.6, and 39.4%, respectively, compared to cattle not fed DDGS. Results of research conducted by Engel et al. indicated that heifers supplemented with DDGS tended to have greater pregnancy rates after a 64-day breeding season than heifers supplemented with soybean hulls. Pritchard and Boggs determined that DDGS could be used as the primary protein source for newly received feedlot calves despite a calculated deficiency in rumen degradable protein. Research conducted by Melroe et al. determined that providing supplemental DDGS to cattle grazing spring pastures during the breeding season had no effect on cow reproductive performance or calf performance. Zelinsky et al. found that soybean hull-DDGS diets may less energy-dense than corn-DDGS for finishing lambs. Furthermore, lambs finished on the soybean hull-DDGS diet tended to have more subcutaneous back fat compared to lambs finished on corn and DDGS. Results from Zelinsky and Wertz-Lutz (a) support the hypothesis that soybean hulls can be the sole fiber source in lamb diets diet without adversely affecting rumen function. Zelinsky and Wertz-Lutz (b) demonstrated that when the hay was replaced with soybean hulls and DDGS dietary energy density was increased, and despite poorer nutrient composition of the milk, ewes and lambs performed better.

Impact:
Collectively, the research projects conducted clearly demonstrate the utility of DDGS in livestock diets. This utility provides livestock producers with another feeding option to cope with drought or high-priced feed ingredients. Depending on the pricing of competing feeds there may be opportunity for substantial cost savings to livestock producers in. For example, if a 500-head cow-calf operation feeds 2.5 lb of a $200 per ton commercial product that contains 30% crude protein, and they could replace that feed with DDGS for $125 per ton, the cost savings would be over $7,000. While the numbers may differ, the potential savings is similar across species.

Dairy Science activities spanned over teaching, research and outreach and played an important role in providing reliable science-based information to dairy producers and processors.

Assessment:
Results of research projects conducted at SDSU and other institutions were incorporated into educational programs for livestock producers and industry representatives. Knowledge surveys were conducted before and after the series of six informational meetings conducted across SD. The average overall satisfaction rating for the meetings was 4.27 out of 5.00. Producer ratings on their knowledge of differences co-product feeds, storage and handling, and feeding to beef, dairy, sheep, and swine increased 61, 65, 51, 80, 81, and 84%, respectively, from before to after the meeting. These efforts have resulted in increased interest in and use of ethanol co-products on livestock operations. Dairy Science activities integrated research, teaching and Cooperative Extension Service to help producers and processors increase profit potential through contemporary research in cattle nutrition and products research.

The rapid expansion of the ethanol industry has resulted in an increase in the supply of co-products available for livestock feed. Research at SDSU has clearly demonstrated the utility of these co-products in beef cattle and sheep diets. Identification how co-products can be effectively used in livestock diets and the efforts put forth to transfer new discoveries and research developments to the field, livestock producers have become more informed on how co-products can be used to reduce cost and increase profitability.

Dairy production and processing is a growing phenomenon in the state, with a major infusion of new and expanded dairy producers. The growing ethanol industry has also provided opportunities for the utilization of by-products of the ethanol industry in cattle nutrition. Increased demand from consumers for healthful and quality products led to development of processing research. Dairy cattle nutrition research aimed at developing information for the utilization of by-products in feeding dairy cattle; research aimed at developing dairy products with enhanced health, nutritional and functional value. Faculty participated in technical summits to disseminate research results all over the world (Korea, Mexico, Canada, and throughout the US), including technical publications in Spain and Portugal. Similarly all this information has been made available to local producers through a grant from the South Dakota Corn Council submitted jointly by Animal and Dairy Science. Producers are now aware that as much as 20% of the diet dry matter distillers grains or as condensed corn distillers solubles can be fed to lactating cows and will be well utilized for milk production, with no adverse effects on feed intake or milk composition. Processors are now aware that cultures producing exopolysaccharides can be used in the manufacture of low-fat cheeses. Techniques for vitamin fortification of cheese, reducing ice crystal size in frozen desserts and oxidation in milk were developed.

GOAL ONE FUND SUMMARY
(the following numbers reflect the FY2005 report – these will be amended upon receipt of guidance from the Office of Extramural Programs regarding South Dakota's proposed target)

Total Expenditures by Source of Funds

Hatch	1,491,955
State Match	1,491,955
FTE	196.02
Smith Lever	869,333
State Match	869,333
FTE	46.08

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 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) emphasizing economic development, including the mobilization of 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, healthy and productive members of society through 4-H and other youth development programs; 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: Economic Development
Program description: Biofuels Development. In just seven years, the ethanol industry has become South Dakota's fastest growing industry. There are fifteen ethanol plants currently in production or construction in the state. When all plants are on-line, they will produce one billion gallons of ethanol each year. The SDSU Economics Department and

SDSU Biology/Microbiology Departments lead research and extension efforts in support of South Dakota's growing ethanol industry.

Critical issues addressed by the program: The critical issues addressed by this program was an economic analysis of biomass development in an effort to support overall farm profitability while enhancing the development of alternative energy sources, leading to a reduction in American dependence on imported fossil fuels.

Underserved/underrepresented populations: The section of this report titled "Stakeholder Input Process" describes in detail how the SDSU College of Agriculture and Biological Sciences seeks input from citizens, including underserved and underrepresented populations when determining the educational programs to be offered. Each county actively participates in the program planning process. County Extension Advisory Boards are required by South Dakota law, and provide citizen input, guidance and direction for county programming that targets priority needs and issues. County Extension Advisory Board members are appointed by elected County Commissioners. State Statute requires that membership on the County Extension Advisory Boards represents the racial population mix of the county, and of the various special needs groups in the county. With the active support of college, Extension and research administrators, County Extension Educators regularly monitor local needs and issues. Educators report these needs to Area of Emphasis discipline councils and state administrators.

This program included State Specific.

Source of funds
_X_ Hatch
_X_ Smith-Lever
_X_ State
_X_ Other

Output of this program
SDSU Economists analyzed the availability of biomass in eastern South Dakota and western Minnesota to determine the economic impact of ethanol development on the South Dakota economy. This study also estimated the costs of harvesting, handling, storing, and transporting biomass, and determined the impact of corn demand for ethanol production on the South Dakota corn basis.

Outcome of this program
Economists found that sufficient quantities of biomass in the form of corn stover are available for ethanol production and for other potential processes in eastern South Dakota and western Minnesota. The cost of supplying biomass to a central collecting point with a 50 mile radius averages $50 per ton. The economic impact of ethanol production on the SD economy in 2006 was $2.1 billion, and the South Dakota corn basis improved 20 to 24 cents per bushel due to the increased demand for corn to produce ethanol in eastern South Dakota.

Impact of this program
Biomass is being considered for ethanol production and for powering ethanol plants in eastern South Dakota. As a result of this study, state government policy makers reconsidered the idea of changing the biofuel (ethanol) subsidy structure in South Dakota due to the very positive economic return to the production incentives that were being paid. Additional study of farmer willingness to supply biomass have been undertaken, and basis impacts as an increase in farm price of corn have been incorporated into marketing and management plans of eastern South Dakota farmers.

Assessment:
To assess impact of this economic research effort, ethanol producers were surveyed and case study analyses were conducted to determine continued interest in investing in new biomass processing facilities. Using average cost of production and revenue based on pre and post basis change situations, SDSU determined that corn profitability increased by 25 to 40 dollars per acre in eastern South Dakota. This information led corn producers and policy-makers to support continued development of the ethanol industry. Producers have requested that SDSU continue to seek out efficiencies that will help make the ethanol production process even more feasible. Government officials were asked how the economic impact findings effected developing legislation regarding the ethanol and biomass processing industry. Officials indicated that because the industry was growing at such a rapid pace, SDSU research indicated that no change was needed in the biofuel subsidy structure.

This program was developed in response to changing demand for biomass, specifically corn, to produce biofuels, specifically ethanol. Corn produced in eastern South Dakota previous to expansion of the ethanol industry was transported to the West Coast for export incurring high transportation costs. As ethanol plants consumed the corn produced in South Dakota, less and less had to be transported out of state. The response to this increased demand was two fold: higher corn price and/or improved basis for corn. The impact of improved basis was separated out from other price impacting factors in this SDSU research and found to be 20 to 24 cents per bushel. Farmer revenue and with constant costs, farmer profitability increased by 25 to 40 dollars per acre as a result of this impact. With knowledge of this basis impact, many South Dakota farmers are increasing acres of corn produced by planting more corn on corn and by substituting corn for other crops in their rotations.

Processing of corn into ethanol has impacts on the South Dakota economy as plants are built, new products are sold and new employees spend their pay checks. Incentives for ethanol development were legislated in South Dakota. As the industry grew and became profitable, legislators and other policy makers asked whether or not to continue incentives. SDSU researchers estimated the economic impact of the ethanol industry on the South Dakota economy and found it to be very large, $2.1 billion annually. As a

result the incentives were not challenged and left in place. These incentives encourage more ethanol development in South Dakota.

Program: Improved Quality of Life

Program description: Medical Insurance and Quality of Life for Senior Citizens. More than 14 percent of South Dakota's population are more than 65 years old, which is two percent higher than the national average. The Medicare Prescription Drug Insurance program provided an opportunity for senior citizens to save thousands of dollars each year on prescription drugs.

Critical issues addressed by the program:
This Extension program focused on the one issue of informing all senior citizens in South Dakota about Medicare Part D enrollment options, which required all persons enrolled in Medicare needed to select and insurance plan for prescription drug coverage between November 15, 2005 and May 15, 2006 or face penalties for enrolling in the Medicare Prescription Drug Program after the May 15th deadline. There were 42 plans to select from in South Dakota and tools to help individuals make informed decisions were available only on the internet. Many seniors did not know how to use the internet or did not have access to the internet in rural South Dakota communities. The Part D decision for many individuals was over whelming because of the number of plans available, confusing ads and letters from insurance companies and lack of knowledge about which plan would work best for them. South Dakota Extension Educators recognized and addressed the need.

Underserved/underrepresented populations: The section of this report titled "Stakeholder Input Process" describes in detail how the SDSU College of Agriculture and Biological Sciences seeks input from citizens, including underserved and underrepresented populations when determining the educational programs to be offered. Each county actively participates in the program planning process. County Extension Advisory Boards are required by South Dakota law, and provide citizen input, guidance and direction for county programming that targets priority needs and issues. County Extension Advisory Board members are appointed by elected County Commissioners. State Statute requires that membership on the County Extension Advisory Boards represents the racial population mix of the county, and of the various special needs groups in the county. With the active support of college, Extension and research administrators, County Extension Educators regularly monitor local needs and issues. Educators report these needs to Area of Emphasis discipline councils and state administrators.

Because Medicare Part D is a program for all seniors, regardless of race, economic standing or other factors, this Extension program was truly designed for all seniors in the state.

This program included State Specific, Multi-State Extension Components.
Multi-State Extension – participating states included: SD, WI, ID, NE, CO, WY, PA, Harvard University

Source of funds
___ Hatch
_X_ Smith-Lever
_X_ State
_X_ Other

Output of this program
SDSU Extension Family & Consumer Science Educators and State Specialist in South Dakota recognized the stress that many individuals on Medicare were having as they tried to decide which of the 42 Prescription Drug Insurance plans to enroll in before the May 15, 2006 deadline. The Extension Educators developed a Part D educational marketing campaign to help individuals and families learn about Part D, find out where they could go for help researching the plans, how to enroll and where they could go in their communities to receive help and have questions answered. The Extension Educators partnered with several agencies (SHIINE, Social Services, Medicare Assistance Program, Social Security Administration and Center for Medicare Services) and local volunteers. Extension Educators worked one-on-one with clients to answer questions, assist with applications for low-income assistance from Social Security, run the Medicare Plan Finder on the internet to compare insurance plans so the clients could make an informed decision and helped others enroll in Part D plans over the internet.

Outcome of this program
Based on reports from SDSU Extension Family & Consumer Science Educators in South Dakota the following are the results of the Medicare Prescription Drug Insurance educational efforts and partnerships from December 2005 to October 2006:

Educators organized and taught 269 educational programs to 9,867 individuals to help them better understand Part D insurance and to protect them from consumer fraud.
Educators answered 3,077 individual questions about Part D over the telephone or from individuals coming to an Extension Office

- 61 SDSU Extension Educators and support staff helped 2,904 Medicare beneficiaries and their care takers do personalized plan comparisons of the 42 plans using the Medicare Plan Finder on the internet. The plan finder narrowed the plans down to the top three plans that covered the medicines individuals were taking, plans that were available at pharmacies of individual's choice and lowest cost to individual.
- Educators helped 1,703 individuals enroll in a Part D insurance plan using the internet.
- Educators helped 212 low-income individuals apply for financial help from Social Security to help pay for Part D Insurance and prescription drugs.

- County Extension Offices in every South Dakota County served as a point of contact for 3,385 Medicare beneficiaries and caregivers who were trying to understand the new Medicare Part D Insurance and decrease their cost for prescription drugs.
- Educators helped 340 individuals resolve problems they were having with their Part D Insurance companies.
- Educational Marketing Campaign
  - Educators created and Distributed Table Tents, Posters and Flyers across South Dakota to educate persons on how to search out Part D plans that would cover their medicines and at the pharmacy they use as well as tips to protect them from consumer fraud.
  - Two Extension Fact Sheets were created and distributed to help educate persons on how to activate and use their Part D insurance plans.
  - Educators wrote church bulletin announcements and mailed to churches asking them to include the contents in their weekly bulletins. The bulletin announcements focused on families needing to talk to their family members on Medicare about Part D, what they could do to help ease the stress their loved ones were facing about the decision on Part D and where they could go for help locally.
  - Educators and State Specialist did the following as part of the media campaign 5 state wide television programs, 5 radio spots reaching 52 radio stations, 1hour long radio call in show, 40 professionally designed displays were used across South Dakota at a variety of events and county educators wrote and published 112 articles and other publications for clientele that reached an estimated circulation of 700,000.

- Extension Educators collaborated/partnered with Indian Health Services, clinics, Senior Nutrition Sites, Hospitals, Senior Housing, SD Career Center, Medicare Assistance Program (MAP), SHIINE, Social Security Administration, city offices, libraries, local pharmacies, SD Social Services, community centers, assisted living facilities, RSVP Volunteers, nursing homes, churches and others to help educate individuals on Medicare so they could better understand prescription drug insurance. Referrals were made from many of these places as well as given to others. All listed worked together to help those on Medicare better understand Part D Insurance.
- Extension Educators trained and worked with SHIINE & MAP Volunteers. The volunteers assisted individuals across South Dakota on Medicare by answering Part D questions, running personal plan finders and helping enroll individuals in prescription drug plans of their choice. Many of the volunteer totals are not included in the numbers listed above.

Impact of this program

- Persons on Medicare in South Dakota saved over *$1.5 million dollars* (or $1,513,188) on their medications in 2006 as a result of the education and assistance with the CMS Plan finder tool they received from the Extension

Educators. This education allowed individuals to select the best Part D plan for their individual situation. (The total savings is estimated conservatively as this calculation was made for about two-thirds of the clientele served)

- South Dakota had the *highest percentage of eligible beneficiaries enrolled in Medicare Prescription Drug Insurance in the seven-state region at 95.4%; this was the third highest per capita enrollment in the nation* (numbering about 120,000 South Dakota Beneficiaries).
- South Dakota ranked *first in the Nation for improvement in the number of individuals enrolled in a Part D Plan from January 2006 to May 15, 2006.*
- Comments from some of the Medicare beneficiaries who received individual help from the SDSU Extension Family & Consumer Science Educators:
  - *"Thank you; you have relieved a lot of stress for me. Now I can celebrate the holidays and not worry about what I am going to do with Part D."*
  - *"Thank you now I can sleep at night."*
  - *"Thank you for helping me find a Part D plan so I can afford and take all of my medicines each month instead of having to take turns with them."*
  - *"I am so glad I saw the news release about contacting the Extension Service for help with Part D. I signed up for a plan with an insurance agent and it doesn't even cover three of my medicines. Thank you for helping me to be a better consumer and find plans that cover all of my medicines and the one I picked even saves me more money."*
  - *"After talking with you I understand Part D better and can now make a decision of what plan to enroll in."*
  - *"Thank you for taking the time to find out what type of prescription insurance I had since retirement from my job. I would have signed up for Part D and canceled my other insurance if you had not helped me to understand what I needed to do. I wish someone would have told me sooner that I had prescription drug insurance as part of my retirement benefits. I have been paying full price for a long time. You have saved me a lot of money."*

Assessment:

The Medicare Prescription Drug Insurance education effort by the South Dakota Cooperative Extension Service was extremely successful because persons on Medicare, their family and caregivers received the information and help needed so they could make informed decisions about Medicare Part D by the May 15, 2006 deadline. Without the educational programs, huge media campaign and one-on-one help South Dakota Citizens would not have been able to save over $1.5 million dollars on their medications in 2006. South Dakota would not have had the highest percentage of eligible beneficiaries enrolled in Medicare Prescription Drug Insurance in the seven-state region at 95.4% and South Dakota would not have ranked first in the Nation for improvement in the number of individuals enrolled in a Part D Plan from January 2006 to May 15, 2006.

Medicare beneficiaries were allowed to change Medicare Part D plans for 2007 beginning on November 15, 2006 to December 31, 2006. The South Dakota Cooperative Extension

Service again launched a media campaign to educate about the new changes and assisted individuals by answering questions and providing one-on-one help. Because SDSU Extension Service is widely recognized as credible source for Medicare Information in South Dakota, Extension Educators again helped: 1203 individuals to research plans on the internet using the Medicare Plan Finder, 593 individuals to enroll using the internet, 50 new individuals with "Extra Help" applications, 37 individuals with Redetermination of Qualifications for Low Income Subsidy and 118 individuals with special problems they were having with Medicare Prescription Drug Insurance. The South Dakota Extension Service continues to be a valuable resource to individuals on Medicare, their families and caregivers.

Program: Youth and Family Development

Program description: Youth Development and 4-H. The youth of our state represent the future leaders of South Dakota. The SDSU Cooperative Extension Service places a priority on developing South Dakota's future leaders. Enrollment in 4-H programs is higher today than it has been since the late 1980s, with an enrollment of 10,500 young people. They represent 6.4 percent of all young people between the ages of 5 and 19 in the state.

Critical issues addressed by the program: The Youth Development and 4-H program focuses on three critical issues: the development of character, farm safety, and Native American cultural awareness.

Underserved/underrepresented populations: The section of this report titled "Stakeholder Input Process" describes in detail how the SDSU College of Agriculture and Biological Sciences seeks input from citizens, including underserved and underrepresented populations when determining the educational programs to be offered. Each county actively participates in the program planning process. County Extension Advisory Boards are required by South Dakota law, and provide citizen input, guidance and direction for county programming that targets priority needs and issues. County Extension Advisory Board members are appointed by elected County Commissioners. State Statute requires that membership on the County Extension Advisory Boards represents the racial population mix of the county, and of the various special needs groups in the county. With the active support of college, Extension and research administrators, County Extension Educators regularly monitor local needs and issues. Educators report these needs to Area of Emphasis discipline councils and state administrators.

Fifteen percent of the 4-H members represent minority populations. School enrichment programs where SDSU Extension partners with local school districts and others have reached nearly 51,500 students to provide at least six hours of Extension-structured educational programming. These combined efforts reach 31 percent of the young people of South Dakota. We have Extension educators located at Rocky Ford, Mission and Eagle Butte that work intensively with tribal youth. Extension educators across the state provide special focus on educational programs involving Native American, Hispanic and other minority youth and adults.

All Extension Educator support the youth development and 4-H programs. SDSU Extension works closely with the Cheyenne River Sioux Tribe, and the Federally Recognized Tribal Extension Program in Todd County.

This program included State Specific, Multi-State Extension Components.
Multi-State Extension – partners included: 1994 SD land grant institutions, the Standing Rock Native American Indian Reservation, and Character Counts! partner states.

Source of funds
___ Hatch
_X_ Smith-Lever
_X_ State
_X_ Other

Output of this program:
Character Counts! CC! Coordinators and Extension Educators:

- Organized and delivered the South State Character Education Conference attended by 130 extension educators, counselors, out of school professionals, teachers and volunteers who learned new ideas and strategies useful in building character in you and adults.
- Conducted a 4-H CC! Public Speaking contest with 65 participants combining teaching about character and developing public speaking skills. A CC! essay contest was also offered statewide
- CC! Teen Trainings were held in communities statewide with more than 2000 youth attending. CC! Teacher Training reached several hundred school administrators and teachers.
- The "We Are All Relatives" CC! curriculum developed for Native American youth and adults was delivered on several reservations to both youth and adults
- Trainings specific to bullying and other problem behaviors were offered to youth and adults in several communities
- After school and summer youth programs offered in various communities included character education in their programming and reached several hundred youth
- Extension educators incorporated character education into many youth activities. Examples of this would include teaching responsibility as a part of youth livestock programming and respect when working on group activities. This work reached thousands of youth statewide

Increase Native American Indian Youth Knowledge of Traditional Culture

- Cultural Day Camps held in six locations on two reservations teaching 134 youth traditional knowledge and practice and preparing native foods.
- Shape-Up Family Style program delivering wellness education in a community with a high Native population –focus on family centered activities

- Establishing 4-H After School Clubs on several Reservations in conjunction with 1994s to increase communication within the community and within families and teach life skills and leadership
- " We are All Relatives" curriculum training specific to training Native American youth teens to work with younger children

Farm Safety Youth Camps
Information and experiential opportunities were provided on:

- Health Topics such as West Nile and Using Sunscreen
- Recognizing hazardous materials
- Being safe around animals
- Using protective gear
- Using lawn mowers and small machines safely
- Increasing awareness of need to be alert and recognize danger
- First aid and 911

Outcome of this program:
Character Counts!
These programs were developed and offered in response to growing concerns expressed by teachers, parents and others regarding concerns about observed youth behavior problems in classrooms, at home and in the public. The CC! program is a joint effort between SDSU Extension, the 4-H Foundation and local school districts, business partners and communities state wide.

Increase Native American Indian Youth Knowledge of Traditional Culture
These programs were developed in response to Native American adults reporting many Native American youth lack an understanding of their own culture and history. The programming was a collaborative effort of the staff of many of the funding entities listed above.

Farm Safety Youth Camps
This programming was developed in response to the fact that 85% of machinery related deaths of children are related to farm machinery and that these and other farm and ranch related injuries and death can be prevented by teaching young people to recognize danger and how to safely interact with farm animals , machinery and the overall environment.

Impact of this program:
Character Counts!

- Reports by teachers and school administrators who have adopted the curriculum that they observe less bullying and other disruptive behaviors after CC! training
- Reports that students involved in CC! programming show increased respect for others and more openness to diversity.
- A student council group reported an increase in positive attitudes in fellow students at school and in the community after training.

- Native American staff report youth show increased pride in their culture and interest in working together.
- Improves ability of youth and adults to work together in a respectful manner.

Increase Native American Indian Youth Knowledge of Traditional Culture

- Increased awareness of Native American food and culture by youth who participated.
- Teaching experience for eight Native American college students
- Increased acceptance of Extension programming on the reservations where programming was offered
- Improved working relationship with two 1994 institutions
- Increased awareness of the need to communicate effectively and network.
- Adults on the reservation learning that youth need culturally relevant programs to help them learn about their culture.
- Identifying that positive youth programming during out of school time is needed.
- Appreciation expressed for the programming offered

Farm Safety Youth Camps

- Several hundred youth and many adults statewide were reached through this programming.
- Pre and post tests indicate youth increased their knowledge of how to be safe as a result of the education they received.
- Many positive comments were received from both youth and adults who attended regarding how much they had learned and how they were going to do things different as a result of the education
- Youth were able to list several things they would no longer do as a result of what they had learned (i.e. Not having riders on the tractor, not to play on farm equipment and not to mow across the hill with a rider mower)

Assessment:

While the percentage of South Dakota youth served by 4-H has increased 17.6 percent in 2006, the percentage of all state youth enrolled in 4-H or other similar programs offered by SDSU has increased 16.6 percent. In 2006, 70,473 young people participated in six hours or more of instruction. Student enrollment in voluntary educational programs often reflects peer influences. The increase in enrollment indicates that young people are not only enjoying the educational experience, but also are learning things that they feel are valuable in their lives and futures.

GOAL TWO FUND SUMMARY
(the following numbers reflect the FY2005 report – these will be amended upon receipt of guidance from the Office of Extramural Programs regarding South Dakota's proposed target)

Total Expenditures by Source of Funds

Hatch	262,524
State Match	262,524
FTE	16.29
Smith Lever	372,571
State Match	372,571
FTE	19.75

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: Livestock Health and Safety
Program description:
SDSU livestock health and safety programs are led by the SDSU Department of Veterinary Science, with support from the South Dakota Animal Disease Research and Diagnostic Laboratory. Livestock health programs focus on solving state-specific issues of animal health.

Critical issues addressed by the program:
Critical issues include: food animal infectious disease, especially diseases of cattle, swine, sheep and poultry. Specific research programs are ongoing relative to enterotoxigenic *E. coli, E. coli O157H7, Salmonella,* BVD virus, PRRS virus and Chronic Wasting Disease. The SDSU Veterinary Extension program is directed at informing veterinary practitioners and producers about significant animal health issues. In the past year our extension efforts have focused on Bovine Genital Trichomoniasis, Anthrax, and Avian Influenza.

Underserved/underrepresented populations: The section of this report titled "Stakeholder Input Process" describes in detail how the SDSU College of Agriculture and Biological Sciences seeks input from citizens, including underserved and underrepresented populations when determining the educational programs to be offered. Each county actively participates in the program planning process. County Extension Advisory Boards are required by South Dakota law, and provide citizen input, guidance and direction for county programming that targets priority needs and issues. County Extension Advisory Board members are appointed by elected County Commissioners. State Statute requires that membership on the County Extension Advisory Boards represents the racial population mix of the county, and of the various special needs groups in the county. With the active support of college, Extension and research administrators, County Extension Educators regularly monitor local needs and issues. Educators report these needs to Area of Emphasis discipline councils and state administrators.

Veterinary Science Extension, research and testing programs are available to all South Dakotans. The ADRDL is designated as the official animal testing laboratory in the state by the State Veterinarian, meaning that all animal test samples go to SDSU first. At the discretion of SDSU veterinary science faculty, other states may be asked to also participate in testing and diagnosis.

This program included Integrated, Multi-state Research components:
Multi-State Research – participating states and agencies include: USDA, IL, SD, MO, KS, IA, MN, NE, NC, MD, MT, WY, ND, OH, VA, the 13 land grant universities associated with the NC-229 committee, and veterinary laboratories associated with the Food Emergency Response Network (FERN) and the National Animal Health Laboratory Network (NAHLN). In addition, the department has cooperative research arrangements with the National Institute of Health, National Cancer Institute; National Institute of Health, Midwest Regional Center of Excellence for Biodefense and Emerging Infectious Disease Research; the Egyptian Educational and Cultural Bureau; the South Dakota Department of Health, and National Centers for Disease Control.

Multi-State Extension – ND, MT, WY

Source of funds
_X_ Hatch
_X_ Smith-Lever
_X_ State

_X_ Other – federal grants

Output of this program
SDSU works to improve animal health and food safety, and to provide science-based information to ensure consumers of a safe and abundant food supply. Several examples of this work by CES and AES scientists follow.

- E. coli – E. coli continues to be researched as both a primary pathogen in neonatal livestock and as a food safety issue when it contaminates food for humans.
- BVD – This viral disease of cattle is now considered one of the most economically significant pathogens of the dairy and beef industry.
- CWD – Chronic Wasting Disease (CWD) is a disease of deer and elk. It is a prion disease that appears to be naturally found in wild cervids. There is concern that this disease could transfer from the wild to cervid ranches, which raises food destine for human consumption.
- Diagnostic Research and Development – The department participates in two major national diagnostic networks. The *Food Emergency Response Network* (FERN) and the *National Animal Health Laboratory Network (NAHLN).* Both networks promote animal health via improved testing techniques and strategic surveillance and response activities.
- PRRS – The Porcine Reproductive and Respiratory Syndrome virus continues to be a major economic problem of the swine industry, worldwide.

Outcome of this program

- E. coli – Research to better understand how this organism attaches to cells and produces disease is ongoing. Genetic traits related to attachment may lead to the development of resistant seed stock.
- BVD – Research to improve the efficiency of and decrease the cost of identifying persistently infected animals has led to a new test being added to the ADRDL. The new test decreases the cost of carrier screening by about 50%.
- CWD – One of the bottlenecks of research with this prion diseases is the extremely long incubation period (months to years) before disease is produced. This naturally slows the rate of experimentation. Studies to develop a better animal model for this disease are ongoing to solve this problem.
- Diagnostic Research and Development – As a member of the FERN, the ADRDL is working with other member labs to produce validation data for improved test methods for food safety testing of human food products, such as E. coli, Listeria, and anthrax. Similar activities are occurring with the NAHLN, directed at key foreign animal diseases.
- PRRS – Research to sort the virus into different strains is ongoing. This work is important if marker vaccines are to be used in the future.

Impact:
Animal health problems cost producers and consumers and many can increase the health risks to people. Controlling these diseases decreases the cost of food animal products in

the grocery store. Controlling the incidence of zoonotic diseases in our herds and flocks decreases the incidence of health outbreaks of such diseases in people.

Assessment:
The SDSU Veterinary Science Department maintains the high testing standards required to be designated as the state animal testing laboratory by the State Veterinarian and SD Animal Industry Board. In addition to its testing role, the department also conducts research in PRRS, Avian Influenza, Johne's disease, and other livestock diseases. The Department participates in two USDA Coordinated Agricultural Project grants and are multidisciplinary and multi-institutional in nature. These grants are part of the National Research Initiative Competitive Grants Programs, administered by CSREES. In addition, the department is home to one of five South Dakota Governor's 2010 Centers of Excellence. The SDSU Center is dedicated to Infectious Disease Research and Vaccinology. The department is known for the quality of faculty, and the resulting scientific advances.

GOAL THREE FUND SUMMARY
(the following numbers reflect the FY2005 report – these will be amended upon receipt of guidance from the Office of Extramural Programs regarding South Dakota's proposed target)

Total Expenditures by Source of Funds

Hatch	222,194
State Match	222,194
FTE	16.02
Smith Lever	403,619
State Match	403,619
FTE	21.40

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.

Program: Health and Wellness

Program description: Food Stamp Nutrition Education instruction provided by South Dakota State University Cooperative Extension Service paraprofessionals focuses on teaching food stamp eligible individuals and families across the lifecycle. Educational services provided under the auspices of the *Family Nutrition Program*, included twelve counties in FY2006: Beadle, Brookings, Brown, Codington, Davison, Grant, Hanson, Kingsbury, Lake, Moody, Sanborn, and Yankton.

The South Dakota Nutrition Network assisted schools with high percentages of food stamp eligible students and connected community agencies that deliver food, nutrition and physical activity messages to food stamp eligible audiences. Delivery of SDNN programming in FY2006 included contact with 112 income-qualifying schools across the state.

Critical issues addressed by the program: Critical issues addressed by this program include: 1) dietary quality, 2) food budgeting and resource management skills, 3) food safety behaviors, and 4) usage of food security measures.

Underserved/underrepresented populations: The section of this report titled "Stakeholder Input Process" describes in detail how the SDSU College of Agriculture and Biological Sciences seeks input from citizens, including underserved and underrepresented populations when determining the educational programs to be offered. Each county actively participates in the program planning process. County Extension Advisory Boards are required by South Dakota law, and provide citizen input, guidance and direction for county programming that targets priority needs and issues. County Extension Advisory Board members are appointed by elected County Commissioners. State Statute requires that membership on the County Extension Advisory Boards represents the racial population mix of the county, and of the various special needs groups in the county. With the active support of college, Extension and research administrators, County Extension Educators regularly monitor local needs and issues. Educators report these needs to Area of Emphasis discipline councils and state administrators.

The audience for these programs is most often in the lower-income range. SDSU cooperates with the SD Department of Social Services, SD Office of Economic Assistance, and USDA Food Stamp Program to inform all people receiving these services of the educational programs that are available to them.

This program included State Specific and Multi-state Extension components:

Multi-State Extension – SD collaborates with North Central Region States in the development of education materials for this program.

Source of funds
____ Hatch
_X__ Smith-Lever
_X__ State
_X__ Other – federal grants

Output of this program
Extension staff conducted nutrition classes at congregate meal sites, adjustment training centers, income qualifying schools and preschools, after-school programs, alternative high schools, Head Start, and Healthy Start programs. Where facilities are limited and group education is not possible, individual walk-by demonstrations are provided. Locations include local WIC sites, Social Services offices, food pantries and emergency meal sites, and community counseling centers.

Outcome of this program
Program participants received the following key messages through educational lessons, fact sheets and newsletters:

- Eat more fruits and vegetables for better health.
- Choose foods using MyPyramid and the Dietary Guidelines.
- Keep food safe (wash your hands, watch cooking temperatures, store food safely).
- Stretch your food dollar (through meal planning and shopping).

Impact
A conservative estimate of unduplicated individuals receiving direct contact through group classes and one-on-one teaching is 2,150. This number is an estimated one-fourth of the individuals receiving economic assistance (8,360) within these counties. FNP participants are predominately white, female, and not disabled.

Self-reported improvement in behavior of participants was tracked by local FNP nutrition assistants throughout classroom and one-on-one interactions with adults and seniors.

Dietary Quality

Number of participants who…

1357 moved closer to MyPyramid serving recommendations

1041 moved closer to Dietary Guidelines recommendations

1296 increased their level of physical activity

1590 increased fruit and vegetable consumption

In FY2005, 656 individuals reported increased fruit and vegetable consumption. Additional efforts were made to target this behavior in FY2006, and as a result 1,590 participants reported an increase in fruit and vegetable consumption.

A senior series on fruit and vegetables has resulted in an increased consumption of spinach over the course of the summer, despite the recent problems with bacterial contamination of fresh greens within the United States food system. Many seniors have planted and grown their own spinach, which has allowed them better access to fresh vegetables in rural locations.

Food Resource Management and Shopping Behavior

Number of participants who...

418 use a spending plan more often

369 utilize a menu plan more often

461 shop from a list more often

978 comparison shop more often

Goal setting is frequently a component of budgeting discussions. One SDSU Extension staff member asked participants to think of any extras that they could easily do without in one day – such as candy or soda—and then multiply the corresponding dollar amount by days, weeks, and months. This practice was used to show how much money could be saved – and potentially used for other things. As a result of this lesson, one young mother has started reducing soda consumption, and has started saving money for a dishwasher.

Food Safety

Number of participants who...

1787 more often wash hands before meal preparation/eating

1736 less often left food sit out more than 2 hours

404 more often keep raw meat separate from other foods

377 more often cook meat and eggs thoroughly

Food Security

Number of participants who...

358 decreased use of emergency food assistance (e.g. food pantry, soup kitchen)

434 increased use of non-emergency food assistance programs (e.g. Food Stamp Program, WIC, Child Nutrition Programs)

Number of participants who (after education) reported having enough to eat:

1922 always

603 most of the time

20 sometimes

10 never

Assessment:
Since the inception of the series, audiences have expanded fruit and vegetable offerings to their families, and made better overall spending decisions leaving more money for the purchase of healthy foods.

Program: Food Quality
Program description: South Dakota State University Cooperative Extension Service addresses the FoodSafety training needs of South Dakotan's in foodservice operations in rural areas primarily through schools, childcare settings, senior nutrition sites, meat processing plant employee trainings, and temporary food stands.

Critical issues addressed by the program: The SD Department of Health State Epidemiologist Infectious Disease report addresses the incidence of foodborne illness in South Dakota as higher than our neighboring states per 100,000 population. SD also ranks above the national average in the incidence of foodborne illness per 100,000 population. Furthermore, our childcare settings have experienced dramatic increases (500+%) in Shigellosis twice in the last 6 years.

Underserved/underrepresented populations: The section of this report titled "Stakeholder Input Process" describes in detail how the SDSU College of Agriculture and Biological Sciences seeks input from citizens, including underserved and underrepresented populations when determining the educational programs to be offered. Each county actively participates in the program planning process. County Extension Advisory Boards are required by South Dakota law, and provide citizen input, guidance and direction for county programming that targets priority needs and issues. County Extension Advisory Board members are appointed by elected County Commissioners. State Statute requires that membership on the County Extension Advisory Boards represents the racial population mix of the county, and of the various special needs groups in the county. With the active support of college, Extension and research administrators, County Extension Educators regularly monitor local needs and issues. Educators report these needs to Area of Emphasis discipline councils and state administrators.

South Dakota law requires that all licensed food service establishments have at least one person that is certified in Food Manager Sanitation. Many food service establishments in the rural areas have difficulty locating an approved course that is available when needed. Usually they are prompted by a visiting health inspector that their license has expired, leaving them little time to renew. The health inspectors have been telling them to call the Extension Office to see when the next local class would be offered. The ServSafe® course is eight hours in length and is followed by a national certification exam. Re-certification for food service managers is required every 4 years and has resulted in the greatest demand.

This program is State Specific.

Source of funds
_ ___ Hatch
_X__ Smith-Lever
_X__ State
_X__ Other – federal grants

Output of this program
Seven ServSafe® courses that were eight hours in length were offered, reaching 132 foodservice managers. Of the 132 participants, 120 took the exam. Of those taking the exam, 84% successfully completed the course.

Outcome of this program
ServSafe® was taught at the SD School Foodservice Institute reaching 65 school foodservice personnel. 89% successfully completed the course (this pass rate is reflective from all participants including courses taught by instructors outside of extension). From this course many schools identify a need to provide additional training to their staff. Extension educators commonly provide an in-service or resources to assist school foodservice managers in training. Five Extension personnel provided in-services to school foodservice personnel.

The recertification course *Serving Food Safety in South Dakota* was offered to 108 foodservice managers through seven courses. This course is very successful in that it addresses any changes to the food code and concentrates on the critical factors that are of biggest risk to the safety of the food served in South Dakota. This course is continually updated to reflect changes in the SD Food Code and address the trends of unsafe food handling in all types of foodservice establishments.

The SDSU CES and Child and Adult Nutrition Service (CANS) continue to strengthen their collaboration in food safety programming. In 2006 the CANS representative and SDSU Extension FoodSafety Specialist and Field Staff trained school foodservice personnel in implementing their FoodSafety plan with HACCP principles.

The SDSU Cooperative Extension Service FoodSafety Webpage is continually updated to provide a resource for school foodservice to utilize in developing their plans. At the summer institute the SDSU Extension Food Safety Specialist incorporated a computer lab so the participants could leave with their programs near to completion, on a CD-ROM and also a hardcopy. Since this course, the Extension Educators and the CANS representative are using the same approach whether they are working one-on-one or with a larger group.

School in-services to train staff on using the FoodSafety plans have been provided by Extension educators and the Extension specialist to assist in the implementation of their school's plan. Five formal in-services were provided with several schools participating. Five Extension staff provided six in-services reaching over 50 school foodservice

personnel. The school foodservice continues to identify needs within school foodservice that Extension can play a critical role in providing the expertise and/or leadership

Reaching temporary food stands is very critical in providing a safe food. Some community event planners require their food vendors to attend an Extension FoodSafety training program. In one area of the state the health inspector has decreased the number of inspections. The local inspector has stated that the safe foodhandling by the vendors at this event has improved. He contributes it to the annual training program provided by the local Extension Educators.

Childcare providers received food safety training at their conferences from Extension staff. Last year over 200 childcare providers were trained in safe food handling. The critical safe foodhandling practices most often identified by childcare providers that will be improved upon include hand washing, eliminated cross contamination, enforcing the policies related to sick employees and children, cooling foods correctly and cooking foods to a safe temperature.

Impacts
Participants identified and made changes in the following food handling practices in their establishments that reduce the risk of foodborne illness (from evaluation forms sent out by an Extension Educator following a ServSafe course):

- Change the sanitizing solution more frequently.
- Leave the detergent out of the sanitizing solution.
- Check sanitizing solution with test strips.
- Log time and temperature.
- Update my cooks about the time and temperature changes.
- Train employees in proper hand washing and hygiene.
- Check temperature of foods when hot and cold holding.
- Post hand-washing signs.
- Separation between high reaction food allergens and other foods on the school food bar.
- Will use safer ways to handle food to keep is safe.
- The correct way to store leftovers.

Assessment
Food safety education is widely believed to be essential to the prevention of foodborne illness in the U.S. It is difficult to place an economic value on the educational efforts simply because the purpose is prevention and it is nearly impossible to estimate how many cases of illness were prevented through educational efforts. Therefore, assigning value to education efforts needs to be conservative and the method of calculation know in order for the estimated value to be credible.

The National Restaurant Association (NRA) has estimated that the average cost of a foodborne illness outbreak to an establishment is about $75,000. Factors such as loss of

business and respect and increased insurance premiums could cost the operation. Calculations on these statistics come from the National Restaurant Association and information from the North Carolina Extension Service publication "Identifying Economic Value-Strengthening and Sustaining Families".

At the sessions we presented, 48 facilities represented X $75,000 = $3.6 million estimated economic value to area food service establishments.

GOAL FOUR FUND SUMMARY
(the following numbers reflect the FY2005 report – these will be amended upon receipt of guidance from the Office of Extramural Programs regarding South Dakota's proposed target)

Total Expenditures by Source of Funds

Hatch	180,098
State Match	180,098
FTE	21.46
Smith Lever	310,476
State Match	310,476
FTE	16.46

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: Environmentally Sound Livestock Management Practices

Program description: This research and Extension program focuses on the ecologically sound production of beef cattle on rangeland, and is led by the SDSU Department of Animal and Range Sciences.

Critical issues addressed by the program: The largest single natural resource in South Dakota is its rangelands, which occupy over 50% of the land area of the state. Rangelands provide forage for livestock, habitat for wildlife, and recreational opportunities for people of all ages. Rangelands are the basis of the cow/calf industry in South Dakota, and their protection and enhancement are critical to not only the sustainability of this natural resource, but also the sustainability of the ranching industry. Critical issues include: cost of beef cattle production on rangeland, effects of climate and grazing on rangeland vegetation, and range management training.

Underserved/underrepresented populations: The section of this report titled "Stakeholder Input Process" describes in detail how the SDSU College of Agriculture and Biological Sciences seeks input from citizens, including underserved and underrepresented populations when determining the educational programs to be offered. Each county actively participates in the program planning process. County Extension Advisory Boards are required by South Dakota law, and provide citizen input, guidance and direction for county programming that targets priority needs and issues. County Extension Advisory Board members are appointed by elected County Commissioners. State Statute requires that membership on the County Extension Advisory Boards represents the racial population mix of the county, and of the various special needs groups in the county. With the active support of college, Extension and research administrators, County Extension Educators regularly monitor local needs and issues. Educators report these needs to Area of Emphasis discipline councils and state administrators.

Research and educational programs dealing with risk management are available to all agricultural producers. Rangelands are more likely to be found in counties with high Native American Indian populations, or Native American Indian Reservations. Special effort is given to incorporating all rangeland managers, landowners and ranchers, regardless of race, in these Extension programs.

This program included Integrated, Multi-state Research and Extension components:
Multi-State Research – participating states included: SD, ND, MT and WY through the Four State Ruminant Consortium. Texas A&M is also a partner.

Multi-State Extension – participating states included: SD, ND, WY and MT. Texas A&M is also a partner.

Source of funds
_X_ Hatch
_X_ Smith-Lever
_X_ State

_X_ Other – federal grants

Output of this program
Cost of Beef Production on Rangeland - Research and Extension personnel specializing in beef cattle production, reproductive physiology, range management, and economics from SD, ND, and WY have teamed up to evaluate potential rangeland-based cow/calf production systems for both environmental and economic sustainability. Over the past several years, 4 State Ruminant Consortium projects (multi-state research and extension, integrated research and extension) focused on the impacts of the major components of these production systems, including time of weaning, winter cow management, and replacement heifer development.

Effects of Climate and Grazing on Rangeland Vegetation – Extension and research programs have focused on prediction of annual production using climatic data, the influence of season and severity of grazing on total annual production, and vegetation response to drought.

Range Management Training - Thirty Extension Educators from SD and ND and NRCS personnel from SD participated in hands-on management consultations with producers as part of multi-state and multi-discipline teams. Thirty ranchers attended the SD Grazing School to increase their knowledge of grazing management from a systems perspective. The Balanced Scorecard, published in 2006, was provided to over 600 producers as a strategic planning tool for rangeland grazing management. More than 100 producers attended "Exclosure" workshops where they were able to see the impact of grazing on the amount of forage standing after the grazing season.

Outcome of this program
Cost of Beef Production on Rangeland - Research in SD, MT, ND, WY evaluated the date of weaning and cow and heifer winter feeding within range-based cow/calf production systems. The research indicates that heifers developed on rangeland performed as well as those developed in drylot, with substantial cost savings.

Effects of Climate and Grazing on Rangeland Vegetation – Research indicates that prediction of forage availability can be reliably made by late June, allowing producers to make earlier management decisions regarding stocking rates and the possible need to sell of livestock during times of drought.

Range Management Training – Extension training programs gave land managers and ranchers an understanding of how range systems work, enabling them to address problems with a systems approach.

Impacts
Cost of Beef Production on Rangeland – Research has documented the savings of developing heifers on rangeland versus in drylot feedlots. Ranchers in the region have carefully studied this research, and many are making changes in their heifer management programs.

Effects of Climate and Grazing on Rangeland Vegetation - The influence of season (winter, spring, summer) and severity of grazing on total annual production: Range scientists have determined that winter defoliation and light early spring defoliation had minimal effects on total annual production, however heavier use and/or defoliation later in the growing season reduced total annual production. This study demonstrates that summer pastures may be used moderately to provide winter forage without significant losses to production, thereby providing producers with greater flexibility in their winter grazing programs. These results are being extended to producers throughout western SD.

Range Management Training – More than 70 Extension Educators and NRCS staff have participated in range system management training, and have extended this training to more than 100 beef producers and land managers. More than 600 beef producers currently use the "Balanced Scorecard" to evaluate range vegetation.

Assessment

Beef producers and range managers are learning to evaluate range vegetation early in the growing season as a foundation for management decisions that must be made later in the summer and fall. Using research based on decades-long climatic data from the SDSU Livestock Research Station at Cottonwood, SD, range managers can accurately graze pastures with shortgrass, midgrass, and co-dominance of both short and midgrasses. A better knowledge of vegetation, climate cycles and grazing management are helping livestock producers make environmentally sound range management decisions.

Program: Interaction Between Agriculture and Natural Resources

Program description: The SDSU Department of Wildlife and Fisheries Sciences conducts research to determine wildlife and fisheries management research needs, primarily in the Northern Great Plains, and address those needs through basic and applied investigations and graduate student mentoring, so as to promote biodiversity and sustainability of natural resources. Extension programs transfer information on the sustainable use of wildlife and fisheries resources to a variety of publics; serve professional, governmental, and citizen organizations that are concerned with these natural resources. Academic programs in the department educate undergraduate and graduate students about wildlife and fisheries sciences and related natural resource issues to enable them to contribute to the betterment of these natural resources as professionals and interested citizens.

Critical issues addressed by the program: This program focuses on four critical issues 1) wildlife/fisheries/agriculture interactions; 2) survey and assessment of wildlife and fisheries resources; 3) wetland resources; and 4) biostress interactions.

Underserved/underrepresented populations: The section of this report titled "Stakeholder Input Process" describes in detail how the SDSU College of Agriculture and Biological Sciences seeks input from citizens, including underserved and underrepresented populations when determining the educational programs to be offered. Each county actively participates in the program planning process. County Extension Advisory Boards are required by South Dakota law, and provide citizen input, guidance and direction for

county programming that targets priority needs and issues. County Extension Advisory Board members are appointed by elected County Commissioners. State Statute requires that membership on the County Extension Advisory Boards represents the racial population mix of the county, and of the various special needs groups in the county. With the active support of college, Extension and research administrators, County Extension Educators regularly monitor local needs and issues. Educators report these needs to Area of Emphasis discipline councils and state administrators.

This program included State specific, and Multi-state Research components:
Multi-State Research – participating states included: FL, MN, WI, OH, IA, NY, MI, NE

Source of funds
_X_ Hatch
_X_ Smith-Lever
_X_ State
_X_ Other – federal grants

Output of this program
Corn By-Products: Explore utilization options for dried distillers grains with solubles (DDGS) in aquacultural feeds. The primary focus is replacing fish meal, to the extent possible, with DDGS.

Digestive Efficiency of Male and Female White-tailed deer: To evaluate differences in digestive efficiency of deer that could be used to minimize depredation of agricultural fields.

Male Turkey Mortality:To estimate annual survival rates of adult male turkeys in the southern Black Hills and to determine the contribution of the unlimited license spring hunting season on adult male turkey survival.

Outcome of this program
Corn By-Products: the research currently underway focuses on omnivorous fishes such as tilapia and channel catfish, which already have an established market for food and sales. These fishes are also most likely to accommodate a higher level of DDGS in their diet, compared to predacious fishes that likely require the higher protein content in fish meal.

Digestive Efficiency of Male and Female White-tailed deer: Lactating female deer and male deer consume about 1.3 kg forage/day. However, male deer weigh up to 20 kg more than females. Deer also spend up to 32% of their time in agricultural fields.

Male Turkey Mortality: Average annual survival for adult male turkeys in the southern Black Hills was 42%, and 73% of all mortality was attributed to spring harvest. Adult

male turkeys in the southern Black Hills have a 49% chance of being harvested during the spring hunting season.

Impacts
Corn By-Products: current prices for fish meal are approximately $800/ton while the DDGS price is approximately $120/ton. Thus, if feasible, replacing part of the fish meal with DDGS will both lower aquaculture production costs and create a new market/demand for DDGS.

Digestive Efficiency of Male and Female White-tailed deer: High forage intake of reproductively active female deer can result in substantial depredation when populations are skewed to females due to harvests that focus on male deer. Therefore, harvesting more female deer has the potential to decrease localized depredation in agricultural fields.

Male Turkey Mortality: South Dakota Department of Game, Fish & Parks requested that additional information be gathered on male turkey mortality in the northern and central regions of the Black Hills to provide needed data to support decisions on issuing spring turkey licenses.

Assessment
Digestive Efficiency of Male and Female White-tailed deer: Up to 25% of corn fields can be damaged due to deer consumption of crops. Reducing number of lactating females using agricultural crop fields can help to reduce depredation to 10% or less, which is the level considered tolerable by land owners/operators. This research, and other similar projects give South Dakota wildlife managers and land owners wildlife management, helping to assure that wildlife and agriculture may co-exist.

GOAL FIVE FUND SUMMARY
(the following numbers reflect the FY2005 report – these will be amended upon receipt of guidance from the Office of Extramural Programs regarding South Dakota's proposed target)

Total Expenditures by Source of Funds

Hatch	163,105
State Match	163,105
FTE	31.23
Smith Lever	1,148,762
State Match	1,148,762
FTE	60.89

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, extended through 2005-06, 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 meetings in August 2002 and November 2004 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 and reporting 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 – the Extension Vision initially called for this board to solicit and coordinate 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. Former South Dakota Cooperative Extension Service administration determined that this board duplicated the function of the State Extension Advisory Board. At the recommendation of the president of South Dakota State University, this portion of the Extension Vision was not implemented.

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, extended to include 2005-06, 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, implemented a new 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, 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.

Each program listed in Goals One through Five in this document includes a brief description of the client need which led to the development of each program, and an evaluation of the successes and challenges as described by program clients. When considering the impact of these individual program evaluations, it is apparent that an integrated approach to client needs is most effective. The individual program evaluations in Goals One through Five also reflect that single discipline approaches to complex client needs is a thing of the past. Clients report greater success when the research and Extension educational resources of several disciplines, and perhaps several states, can be brought to bear on client needs.

Multistate Extension Activities

(the following numbers reflect the FY2005 report – these will be amended upon receipt of guidance from the Office of Extramural Programs regarding South Dakota's proposed target)

Title of Planned Program/Activity	Actual Expenditures for FY 2005
Goal 1	127,444
Goal 2	54,619
Goal 3	59,171
Goal 4	45,516
Goal 5	168,408

Summary of Multi-State Extension Activities

The South Dakota Cooperative Extension Service works closely with other states to provide educational programs. Each program in the Five Goals of this report includes specific listings of collaborating states.

The major Multi-State Extension 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, and the Sun Grant Initiative.

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)

(the following numbers reflect the FY2005 report – these will be amended upon receipt of guidance from the Office of Extramural Programs regarding South Dakota's proposed target)

Title of Planned Program/Activity	Actual Expenditures for FY 2005
Goal 1	527,677
Goal 2	0
Goal 3	7,219
Goal 4	13,780
Goal 5	31,292

Integrated Activities (Smith Lever Act Funds)

(the following numbers reflect the FY2005 report – these will be amended upon receipt of guidance from the Office of Extramural Programs regarding South Dakota's proposed target)

Title of Planned Program/Activity	Actual Expenditures for FY 2005
Goal 1	217,333
Goal 2	93,143
Goal 3	100,905
Goal 4	77,619
Goal 5	287,190

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.

Each program in the Five Goals of this report includes specific listings of Integrated Activities.

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.