

Plan of Work Report

University of Idaho

College of Agricultural and Life Sciences

Idaho Agricultural Experiment Station

**Federal Fiscal Year
2004**

Index to IAES Plan of Work

	<u>Page</u>
Introduction	3
Background Information	3
IAES Program Progress and Update for FY2004	5
A. PLANNED PROGRAMS	5
REE Goal 1: <i>An Agricultural Production System that is Highly Competitive in the Global Economy</i>	
KEY THEME 1: Plant germplasm, genetic resources and conservation, plant health, and well-being	5
KEY THEME 2: Animal health and well-being	6
KEY THEME 3: Crop and livestock production systems	7
KEY THEME 4: Farm business management, economics and marketing	8
Allocated Resources KEY THEME 1	9
Allocated Resources KEY THEME 2	10
Allocated Resources KEY THEME 3	10
Allocated Resources KEY THEME 4	10
REE Goal 2: <i>A Safe and Secure Food and Fiber System</i>	
KEY THEME 5: Food safety and quality	11
Allocated Resources KEY THEME 5	11
REE Goal 3: <i>A Healthy, Well Nourished Population</i>	
KEY THEME 6: Human health and nutrition	12
Allocated Resources KEY THEME 6:	13
REE Goal 4: <i>Greater Harmony Between Agriculture and the Environment</i>	
KEY THEME 7: Soil, water and air quality conservation and sustainable agricultural practices	13
KEY THEME 8: Pollution control and natural resources	13
Allocated Resources KEY THEME 7:	14
Allocated Resources KEY THEME 8:	15
REE Goal 5: <i>Enhanced Economic Opportunity and Quality of Life for Americans</i>	
KEY THEME 9: Enhanced economic opportunity and quality of life for Americans	15
Allocated Resources KEY THEME 9:	16
Summarized Personnel and Allocated Resources by Federal REE Goal	16
B. STAKEHOLDER INPUT PROCESS	16
C. PROGRAM REVIEW PROCESS	18
D. EVALUATION OF THE SUCCESS OF MULTI AND JOINT ACTIVITIES	19
E. MULTI-STATE EXTENSION ACTIVITY	22
F. INTEGRATED PROGRAM ACTIVITIES	22
Appendix C	24
End of Document	24

Plan of Work for the College of Agriculture and Life Sciences (CALs), Idaho Agricultural Experiment Station (IAES), University of Idaho (UI)

Introduction

This **Plan of Work (POW) Report** describes the research programs and impacts of the College of Agricultural and Life Sciences (CALs) and the Idaho Agricultural Experiment Station (IAES) for fiscal year 2004, as required by the Agricultural Research, Extension, and Education Reform Act of 1998 (AREERA). The IAES research project portfolio is segmented into nine different “programs” or Key Theme research areas which are linked to the five National REE Goals. Key Themes 1-4 are linked to **REE Goal 1**, Key Theme 5 is linked to **REE Goal 2**, Key Theme 6 is linked to **REE Goal 3**, Key Themes 7 and 8 are linked to **REE Goal 4**, and Key Theme 9 is linked to **REE Goal 5**. While this organization of the IAES research program portfolio is somewhat arbitrary and imperfect, it does represent a logical framework for accountability reporting for the first POW multi-year cycle. Given changes that occur over a 5-6 year period within a university and college and, more specifically, the dramatic personnel and budget reductions that the UI, the CALs, and the IAES have experienced in the previous three budget years and are experiencing for the current budget year (Idaho FY 2005); our next POW will likely have a significantly different composition. As mentioned in the 2005-2006 Update, we will likely structure that plan based on reprioritization that is currently ongoing and nearing completion.

Contact Person

Dr. Gregory A. Bohach, Director
Idaho Agricultural Experiment Station
College of Agricultural and Life Sciences
University of Idaho
Moscow, Idaho 83844-2337
Voice: 208-885-7173
FAX: 208-885-6654
Email: agres@uidaho.edu

Background Information

University of Idaho (UI)

The UI was created in 1889 by the territorial legislature with a major objective to offer all people higher education in the arts, letters and sciences. Total enrollment during the 2003-2004 academic year was 12,824 including 2,579 graduate students, and 302 law students. The University serves as the main center for research, professional education and research-based graduate programs and has the primary responsibility for granting the Doctor of Philosophy degree in the state of Idaho. In order to carry out its statewide mission, the University maintains instructional centers in Coeur d’Alene, Boise, Twin Falls, and Idaho Falls. Off-campus instruction is also presented at extension offices in 42 of 44 counties, 12 research and extension centers and field stations.

The UI is a Doctoral/Research University-Extensive, the most comprehensive Carnegie Foundation ranking among Ph.D. granting research universities. The National Science

Foundation (NSF) reports that UI historically receives 80-85% of all federal agency science and engineering research funds awarded to Idaho universities and colleges. In its latest available ranking, NSF reports UI in the top 25% (119 of 547) of U.S. universities and colleges in total research and development expenditures from all sources. There has been a 68% increase in total research funding from all sources since 1991 and for the past two year, research income at the UI has exceeded \$100 million.

College of Agricultural and Life Sciences (CALs)

In addition to traditional campus instruction, CALs at the UI serves communities across the state with agricultural and family and consumer science research, and extension or “outreach.” The fall 2004 enrollment totaled 1,011, for CALs. The FY04 budget, including all revenue sources, was approximately \$69 million. The college maintains twelve agriculture research and extension centers across the state to meet unique regional research needs. Over the last few years, CALs has experienced severe budget cuts that have resulted in an approximate 15% reduction in both faculty and support staff positions

Idaho Agricultural Experiment Station (IAES)

The IAES was created in 1892 with a federal allocation due to the Morrill Act (1862), which established the U.S. land-grant educational system and the Hatch Act (1897). CALs has always been a major contributor to research efforts at the UI due the basic philosophy that founded the land-grant educational system and the fact that agriculture has always been a major segment of the Idaho economy. The IAES and CALs have a long tradition of supporting Idaho and Pacific Northwest agriculture, rural communities and families, and food processing industries with information derived from its agricultural research programs. Since it’s beginning, the IAES has been closely linked with- and responsive to- the needs of our stakeholder citizens. Accordingly, the majority of the projects in the IAES research portfolio have been and currently are mission-oriented, and conceived and conducted as a result of stakeholder input. Obviously, these projects (approximately 80% of the IAES project portfolio) entirely or fractionally address specific research priorities articulated by stakeholders. About 20% of the IAES research projects fall into the realm of fundamental research and are focused on the discovery of new knowledge and answering more fundamental questions in the life sciences rather than addressing a specific agricultural or societal problem. This latter category of projects allows the IAES to be responsive to research priorities of the broader university and their importance to the IAES portfolio is both appreciated and supported by many, if not most, of our stakeholders.

In the IAES current POW and this POW Report, the research project portfolio has been divided into 9 different **IAES Programs** which represent our **Key Themes** that fall under the five National RE&E Goals. This has been explained above in the introduction and is further delineated in the text that follows.

IAES PROGRESS REPORT FOR FY2004

A. PLANNED PROGRAMS

REE GOAL 1: AN AGRICULTURAL PRODUCTION SYSTEM THAT IS HIGHLY COMPETITIVE IN THE GLOBAL ECONOMY

KEY THEME 1: Plant Germplasm, Genetic Resources and Conservation, Plant Health and Well Being (IAES Program 1).

Performance Goals:

Identify and manipulate plant germplasm to improve crop plant performance and the production of seed and other plant products. Develop economical, biological and socially compatible crop management strategies that increase production efficiency.

Idaho leads the nation in the production of certified bean seed. However, Idaho has no variety of beans that is rust and mosaic resistant and lacks a variety that is bacterial blight resistant. Consequently, Idaho certified bean seed is not accepted in many states and has resulted in a reduced market share for Idaho certified bean seeds. The IAES participated in release of a common bacterial resistant dark red kidney bean germplasm line. Common bacterial blight is a seed-borne disease of dry and snap beans worldwide. It is endemic to the U.S. bean production regions east of the continental divide and problematic in Colorado, Michigan, Minnesota, Nebraska, New York, North Dakota, and Wisconsin. The release of this germplasm is essential to develop new varieties that are resistant to this disease and, thus, increase Idaho's market share for certified seeds in the U.S. and internationally. Additional new bean varieties have been generated and are scheduled to be released by the UI in two years.

The huckleberry and bilberry variety development program at the Sandpoint R & E Center in north Idaho has developed effective seed and in vitro propagation protocols for five of seven species having commercial prospects. Thirteen advanced selections of mountain huckleberry, oval-leaved bilberry, and bilberry are being propagated for testing by cooperating growers and nurseries and plans are being formulated to release several of these as named cultivars. Forty-eight more selections are in the breeding and advanced trials programs.

An estimated 30% of potato and 50% of sugar beet acreage in Idaho are infested with nematodes and over 50% of the infested acreage requires fumigation which costs \$260 per acre. For comparison, brassicaceae plants, known to produce biotoxins when used as green manure seem to effectively control nematodes and other soil borne diseases at a cost of \$124.50 per acre. Two brassicaceae varieties released by IAES, along with two imported oil radish varieties, were tested for their use as green manure and efficacy against nematodes and wire worms. Field tests show that using brassicaceae plants as green manure reduced nematode populations by 98% on both potato and sugar beet fields. The green manure also supplies more than 17 tons of additional biomass. The material decompresses early and quickly due to its narrow C:N ratio. It supplies more than 150 pounds of mineralized nitrogen. It also increases the soil's organic matter, and improves the physical and chemical properties of the soil. Field studies also show increases in crop yields due to improved soil properties. The gross annual benefit to potato and sugar beet producers using green manure is estimated at over \$17 million and a present value of \$86.5 million. In addition to its economic benefits, the use of green manure will eliminate over 13

million pounds of toxic chemicals from the soils, reduce synthetic nitrogen fertilizer use by 50% for potato and 81% for sugar beets. The slow mineralization of organic nitrogen from the green manure will also reduce nitrate leaches by over 50%.

The UI develops and releases new plant varieties through the Tri-State Variety Development Committee, a collaborative agreement with ARS, Oregon State University, and Washington State University. A recent analysis by the UI's Department of Agricultural Economics and Rural Sociology has shown that potato variety development benefits the Idaho potato industry by over \$51.6 million per year with a present value of over \$380 million. Western Russet was released and licensed through the Tri-State Potato Variety Committee in 2004. As a processing and fresh market variety, it outperformed Shepody and Russet Burbank with 85% of U.S. No 1's compared to 65% for the other two varieties. It has higher yields than Norkotah.

A new biologically (fungal) derived seed treatment was developed to replace chemical treatment through research funded by the IAES and the USDA Cool Season Food Legume Research Program. The biological treatment is low cost in comparison to the chemical treatment and effectively controls soil pathogens that affect yield and quality of chickpeas, peas, and lentils. The results of this research show that using the bio-seed treatment will increase yield by a minimum of 7.5% and reduce treatment cost by \$8.00 per acre. Idaho has 5,000 acres of garbanzos with annual production of 6,000,000 pounds per year. There is also an average of 65,000 acres planted with peas with an annual production of 760,000 cwt. and an average of 68,000 acres planted with lentils with an annual production of 790,000 cwt. The gross annual benefit for chickpeas, peas, and lentil producers is \$4.1 million with a present value of over \$22.9 million. The legume crops are in the rotation system. The results of this research also show that healthy growth of these crops in the rotation system will significantly reduce topsoil erosion, fertilizer use and run-off. It will also reduce active toxic materials due to synthetic chemical seed treatment by 50 to 60%.

KEY THEME 2: Animal Health and Well-Being (IAES Program 2).

Performance Goals:

Improved animal management and the detection, control and treatment of infectious diseases of domestic animals in the Northwest and United States. Animal well-being and performance and livestock and dairy product quality and consistency will be monitored and maintained for the benefit of producers and consumers.

An applied electronic identification record systems to track animal movement for health monitoring was developed and applied to cow-calf operations. In addition to improving animal health for an estimated 500,000 beef cows, the application of the electronic identification system will save cow-calf operators an average of \$5 per head in medical and veterinary costs. The gross annual benefit to the Idaho beef industry is estimated at over \$2.5 million with a present value of over \$11.65 million.

The dairy industry is the largest agricultural commodity in Idaho. Clinical mastitis is a serious problem for the dairy industry throughout the U.S. and in other countries. An estimated 8.9 million cases of mastitis occur in the U.S. annually with approximately \$2 billion in total loss. Results of two studies conducted in the U.S. show that mastitis causes \$107 to \$184.40 loss per infected cow per year. A survey of dairy herds in Idaho shows that 3.5% of the 432,000 head

have mastitis causing an annual loss exceeding \$170 per cow. IAES researchers developed improved disease protection methods and vaccines to protect dairy cattle and prevent incidents of mastitis. One vaccine has received U.S. and international patent protection and has been licensed by L.G. Life Sciences in Korea. The likely gross annual benefit to dairy producers in Idaho from using the technologies developed by IAES is over \$2.57 million with a present value of over \$19.7 million. For the U.S. dairy industry the gross annual benefit will be up to \$6.8 billion with a present value of \$1.35 billion.

KEY THEME 3: Crop and Livestock Production Systems (IAES Program 3).

Performance Goals:

To develop marketing alternatives and product quality and consistency to meet consumer's demands. Loss of natural resources (e.g. soil and water) and agricultural inputs (e.g. chemicals) by Idaho food producers will be decreased.

Analysis of feed rations conducted for 20 dairy herds in Idaho showed high mineral supplements in rations. Studies to determine efficient use of phosphorus (P) in the diet could reduce feed costs by a minimum of \$2.33 per cow per year. Optimal nitrogen (N) use in the ration would reduce feed cost by \$4.70 per cow per year. The gross annual benefit to the Idaho dairy industry is over \$3 million and has a present value of over \$14.55 million. In addition to the economic benefit, optimal phosphorus use in the ration will have significant environmental benefits. A dairy cow produces 8 kg of fecal dry matter (DM). This DM has 0.8% P. Reducing P by 15% would result in a 9.6 g per cow per day reduction in P. For the 432,000 dairy cows in confined feeding facilities in Idaho, an estimated 1,513 tons of P per year would be prevented from entering the environment and potential run-off to surface water. Reducing N in the ration by 5% will prevent 710 tons of nitrate from leaching to ground water.

The effect of using estradiol cypionate to increase pregnancy in beef and dairy cows was analyzed. Although the analysis failed to show an effect for dairy cows, results of field studies showed a 7% increase in pregnancy rates in beef cows. Idaho has 500,000 head of beef cows. The 7% increase in pregnancy rates will result in an additional 35,000 head of new calves. The gross annual benefit to the Idaho beef industry is over \$3.5 million and the present value is over \$13.94 million.

Over 30% of the nation's potatoes are produced in Idaho, and more than 58% of the potatoes produced in Idaho are stored. Potato storage research is critical since diseases such as late blight and pink rot cause a 12% potato loss during storage. In 2004, about 90 million cwt. of potatoes were stored. Results of storage research showed that treatment with phosphoric acid reduced the loss by 80 to 90%. Reducing this loss by 50% will benefit the Idaho potato industry by an estimated \$43 million annually. This gross annual benefit will have a present value of over \$333.43 million. Ranger Russet, is a variety developed and released by the UI and the Tri-State Variety Development Cooperative. This variety has 20% higher processing recovery ratios than Shepody or Russet poundage. However, if stored for over five months, this variety develops high sugar content that results in dark brown French fries and rejection by processors. An estimated 12% of Idaho potato acreage and 35% of Washington potato acreage are planted with Ranger Russets in 2004 with a total production of 62 million cwt. Over 20 percent of this production requires long-term storage and develops high sugar content. The proper storage method developed by the IAES will significantly reduce the sugar content and enhance the production of

gold color french fries. The annual gross benefit to the Idaho and Washington potato industry for controlling sugar content in stored Ranger Russet potatoes is \$49.6 million. The present value of this technology is over \$384.6 million.

Idaho has an average of 10,333 acres planted with onion. Average total production is 6.19 million cwt per year. The three year average price received by producers is \$9.36 per cwt. About 60% of the onion production requires storage. Storage rot causes a 16% loss of stored onions. Research results developed by the IAES, and extended to onion producers in 2004, shows that this loss could be reduced by 80% through proper post-harvest handling and storage. Gross annual benefit to the Idaho onion industry, calculated at 50% reduction in storage rot, is \$2.78 million and has present value of over \$17.7 million. The results of this research are extended to the onion producing counties in Oregon and Washington with total production of 9.6 million cwt. The gross annual benefit to onion producers in Oregon and Washington is estimated at \$4.3 million and the present value of the flow of gross annual benefit is \$27.4 million. In addition to the economic benefit the application of the results of this study will reduce fungicide use by over 10 percent.

KEY THEME 4: Farm business management, economics and marketing (IAES program 4).

Performance Goals:

Provide information to policy makers and to people dealing with ranch property concerning economic values and the part that is played by public grazing rights held by ranchers. Obtain greater knowledge of international trade as it is affected by policies and trade agreement combined with a better understanding of export practices to enhance the opportunity for Idaho and the Pacific Northwest to maintain a strong export market for agricultural products. Increase availability of production and market information for organic niche products, to help modest sized farms increase income potential. Develop a model for wheat price outlook for wheat producers in the Pacific Northwest and information permitting these farmers to market wheat more effectively and/or reduce price risk. Wheat quality will be increased through development of improved storage conditions.

Economic analysis of the impacts of the dairy industry in Idaho demonstrates that the industry has \$2.52 billion of annual sales, supports 18,021 jobs, and annually earns \$542.2 million. This information was used by the dairy industry to educate decision makers to formulate appropriate policies to maintain the industry's rapid rate of growth. Economic analysis to help small cheese plants stay in operation was conducted. Several alternatives were considered and recommendations were made to leaders of the industry.

A budget for natural free range chicken operations was developed for southwest Idaho. The new budget helped increased annual value added by \$208,179, increased annual earnings by \$134,599, helped create five new jobs, and increased annual indirect business taxes by \$15,904. The economic impacts of a community center and supporting office park in Cascade, Idaho shows that fourteen new jobs were created, \$995,000 in new sales, \$556,000 value added, \$321,000 in earnings, and \$48,000 in indirect business taxes were generated.

Economic analysis of building geothermal power plant at Raft River, Idaho showed that the planned 10 megawatt power plant would increase Cassia County annual sales by \$6.3 million, value added by \$4.9 million, earnings by \$1.4 million, create 26 new jobs, and add

\$0.718 million in direct business taxes. In addition, the construction of the 20 megawatt plant would increase sales by \$8.9 million, value added by \$3.7 million, earnings by \$2.8 million, create 105 new jobs, and add \$0.228 million in new indirect business taxes. A 30 megawatt power plant under consideration will increase sales by \$13.8 million, value added by \$10.9 million, earnings by \$3.1 million, create 6 new jobs, and add \$1.58 million in new indirect business taxes. This information was provided to policy makers to make informed decisions.

Current efforts involve analysis of consumer demand shifts due to preferences for low-carb diets, changes in plant variety protection laws that allow for ownership of private potato varieties, the potential economic impacts of genetically-modified potatoes and international trade. Research on potential Chinese potato imports resulted in significant increases in Idaho exports of frozen potatoes to that country. Research on the impact of currency exchange rates on international potato trade showed opportunities for increased exports around the world and decreased competition from Canada as the U.S. dollar weakened. It is estimated that research on international potato trade led to a \$5 million increase in Idaho potato exports over the past five years.

Allocated Resources to KEY THEME 1 (IAES Program 1): Plant Germplasm, Genetic Resources and Conservation, Plant Health and Well being (RPAs 102, 121, 123, 133, 201, 202, 203, 204, 205, 206, 211, 212, 213, 214, 501, 502). Research toward this thematic focus constitutes the largest program of the IAES and includes 40 active research projects enrolled in CRIS and approximately 23.25 Scientist Years (SY) of faculty research effort.

RPA	SY	PY/TY	Amount
102	0	0	0
121	0	0	81,053
123	0	0	27,301
133	0	0	0
201	1.8	4.75	2,600,611
202	1.12	.7	206,819
203	0	0	127,229
204	4.1	3.4	942,303
205	1.58	2.3	517,736
206	.67	0	98,435
211	2.92	3.97	1,484,762
212	5.2	1.52	887,319
213	2.61	1.78	844,871
214	.2	0	33,311
501	2.29	3	297,186
502	.76	2	212,865
Total	23.25	23.42	8,361,801

Allocated resources to KEY THEME 2 (IAES Program 2): Animal Health and Well-Being (RPAs 301, 302, 305, 306, 307, 311, 312, 313, 315). This is the third largest program area encompassing 16 active research projects and approximately 9.19 SY faculty research effort.

RPA	SY	PY/TY	Amount
301	1.91	0	616,254
302	1.3	2	350,337
305	.71	1	187,123
307	0	0	329,743
311	3.47	.66	3,199,521
312	1.2	0	221,244
313	0	0	0
315	.6	0	546,521
Total	9.19	3.66	5,450,743

Allocated Resources KEY THEME 3 (IAES Program 3): Crop and Livestock Production Systems (RPAs 102, 308, 404, 405). This area of research includes 3 active research projects and approximately 1.55 SY of faculty research effort.

RPA	SY	PY/TY	Amount
102	0	0	0
308	.75	1	275,146
404	.8	1	129,012
405	0	0	0
Total	1.55	2	404,158

Allocated Resources KEY THEME 4 (IAES Program 4): Farm business management, economics and marketing (RPAs 402, 511, 601, 602, 603, 604 and 606). Research efforts toward this key theme encompasses 10 active research projects that incorporate approximately 5.2 SY of faculty research effort.

RPA	SY	PY/TY	Amount
402	.5	1.06	157,536
511	.55	0	64,316
601	2.57	0	343,194
602	.7	0	84,949
603	0	0	0
604	0	0	61,090
606	.88	0	115,205
Total	5.2	1.06	826,290

REE GOAL 2: A SAFE AND SECURE FOOD AND FIBER SYSTEM

KEY THEME 5: Food Safety and Quality (IAES Program 5).

Performance Goals:

A better understanding of flavor chemistry as related to sensory properties of selected red cultivars of grapes used in Idaho wines. Obtain additional information on the occurrence, effects and mechanisms of action of toxicants and antitoxicants in food. Improve diagnostic tests for microbial pathogens present in food and better education of the public on food safety issues.

Several viral diseases affect dairy cattle. Viral diseases in cattle such as BVDV, IBR, VSV, BLV, and shipping fever significantly reduce reproductive efficiency in domestic farm animals. IAES researchers have developed and licensed technologies based on quantifying levels of mx protein for early detection of the viral diseases and potential treatment of viral infections. The early testing for viral diseases in dairy cows and prompt treatment of the viral diseases could result in reduced animal deaths, a net increase in milk production, and eliminate unnecessary medical costs by a predicted \$7 per animal. The gross annual benefit to the Idaho dairy industry is over \$3 million.

An IAES microbiologist has identified the site of intestinal colonization by E. coli O157. The localization of the colonization site, specifically to the recto-anal junction now permits the rapid and efficient detection of this life-threatening human pathogen allowing producers to identify colonized animals and prevent them from entering the food chain. Annually, this organism causes thousands of cases of food borne illness from ingestion of feces contaminated with feces from ruminants and results in disposal of millions of dollars worth of contaminated beef products, usually ground beef.

Allocated Resources KEY THEME 5: Food Safety and Quality (IAES Program 5) (RPAs 501, 503, 702, 711, 712). This IAES Program is the only contribution to REE GOAL 2 and includes 5 active research projects and accounts for approximately 2.62 SY of faculty research effort.

RPA	SY	PY/TY	Amount
501	0	0	0
503	0	0	80,562
603	.9	0	77,670
702	0	0	0
711	.2	0	573,965
712	1.52	2	846,086
Total	2.62	2	1,578,283

REE GOAL 3: A HEALTHY, WELL NOURISHED POPULATION

KEY THEME 6 : Human Health and Nutrition (IAES Program 6).

Performance Goals:

Increase understanding of motivators and barriers, attitudes and knowledge about consumption across age, gender, and selected minority groups. To obtain a better understanding of how natural chemicals in the diet interact with cancer processes.

Cholesterol, heart disease, and cancer are associated with saturated fats in milk, dairy products, and meat. Gene expression of dairy and beef cattle was analyzed to determine changes associated with enhancing beneficial fatty acids and reducing saturated fat in milk and meat. This study developed the basic information needed to modify milk composition to improve the pattern of fatty acid by reducing saturated fat. The study also determined lipid mobilization of specific fatty acids in lactating cows to improve the healthfulness of milk and milk products. The results of this basic research will have far reaching impacts on human health and will increase consumers' demand for dairy products and meat.

Several studies analyzed food nutrition, housing, and impact of older immigrants on Idaho rural towns and rural communities. Little is known about what nutrition education strategies should be used for low income families that result in an increase in fruit and vegetable consumption. This research has identified behavior perception, environment, and personal attitudes that influence the decision about fruit and vegetable consumption by low-income families. Idaho has over 53,000 low-income Hispanic families. The results of the research show that improved family nutrition will reduce medical costs by \$50 per family per year. The gross annual benefit to low-income families in Idaho is over \$1.3 million with a present value of over \$8.9 million.

A research project evaluated children's skill development at meal time and group settings in order to improve child nutrition and reduce doctor visitations for children under the age of six years. Idaho has over 115,030 children under the age of six. The results of this study show that participating families save between \$25 to \$50 on medical and food costs. It is estimated that over 60 percent of the children will benefit from the results of this research over the next ten years. The gross annual benefit, using \$25 per child, is over \$2.87 million and the present value is over \$10.42 million.

A research project examined the dietary practices of adults in Idaho. The research was designed to determine adults' knowledge of dietary practices and their perceived health risk of dietary fat and fiber. The results of this study will provide the Department of Health and the Cooperative Extension System with important information to extend to the adult population in Idaho.

The role of culture in infant feeding practices was analyzed for immigrant Russian families and Hispanic families. The results show that in their respective cultures, women have a high rate of breastfeeding infants. However, once in the United States, breastfeeding has significantly declined. The results show that breastfed babies are healthier and will likely have less medical expenses than formula fed babies.

Allocated Resources KEY THEME 6: Human Health and Nutrition (IAES Program 6). (RPAs 504, 701, 702, 703 and 722). IAES Program 6 represents the IAES contribution to REE GOAL 3 and includes 8 active research projects enrolled in CRIS involving approximately 3.09 SY of research effort.

RPA	SY	PY/TY	Amount
504	.23	0	25,895
701	0	0	0
702	.4	0	1,228
703	1.05	0	460,520
723	1.41		398,265
Total	3.09	0	885,908

REE GOAL 4: GREATER HARMONY BETWEEN AGRICULTURE AND THE ENVIRONMENT

KEY THEME 7: Soil, Water and Air Quality Conservation and Sustainable Agriculture Practices (IAES Program 7).

Performance Goals:

Reduced erosion, nutrient depletion, salination and toxification of agricultural soils coupled with increased adoption of precision soil and crop management techniques. Efficient application and utilization of water, fertilizer, pesticides, and other crop and soil amendments for biological control of pests. To meet the water quantity and quality needs of different constituents on a scientific basis through sustainable practices.

This program is aligned closely with Program 8. Since there is considerable overlap in their impacts, they will be reported together below.

KEY THEME 8: Pollution control and natural resources (IAES Program 8).

This program is aligned closely with Program 7. Since there is considerable overlap in their impacts, they will be reported together below.

Performance Goals:

One of the primary projects in this program deals with the economic costs of soil erosion and methods to reduce erosion. Both income effects and health concerns are addressed. A second major goal is to provide a safe environment for the public.

Development of biological control of pests and new varieties of potatoes, wheat, and brassicaceae plants released by the IAES will significantly reduce the need for pesticides and nitrogen fertilizers. It is projected that the use of toxic synthetic chemicals to control soil borne diseases will be completely eliminated and 4 to 5 sprays of synthetic pesticides will also be eliminated. The use of brassicaceae plants as green manure will also reduce synthetic nitrogen

fertilizer use by 150 lbs. per acre on potato and sugar beets. This will reduce nitrate leaches to ground water by over 50 percent.

Results of research on optimum phosphorous and nitrogen use developed and released to potato, wheat, sugar beet and corn farmers will reduce fertilizer run-off by 80 percent and will limit nitrate leaches. Results of research on animal nutrition for dairy cattle will reduce phosphorous run-off and nitrate leaches from accumulated manure in confined feedings by over 30 percent. Idaho confined beef and dairy operations produce over 5 million tons of air dry manure annually. The economic utilization of animal manure was analyzed for three types of manure with different chemical properties applied to five different soils with different chemical and physical properties. The results show that manure can be used at 20 to 50 percent of the cost of synthetic fertilizers. The use of manure will reduce the present nitrate leaches and phosphorous run-off from the use of synthetic fertilizers by over 70 percent.

Economic analyses research on the role of technology of water conservation show that water use on potatoes, wheat, barley, sugar beets, beans, and onions can be reduced by .45 acre feet per acre of these crops. Economical and optimal irrigation will save over 803,250 acre feet of water annually. The gross annual benefit to Idaho crop producers is over \$12.85 million with a present value of over \$78 million.

A remote sensing method developed by the IAES is used to identify hoary cress, purple loosestrife, spotted knapweed, and leafy springs in rangeland in Idaho. About 10 percent of the 21.8 million acres of rangeland in Idaho is infested with these invasive plants. The results of this project detected 50 percent more infestation than was previously observed. The management system developed as a result of this research will improve range conditions and wildlife habitat by 5 percent on 21.8 million acres of rangeland in Idaho.

Allocated Resources KEY THEME 7 : Soil, Water and Air Quality Conservation and Sustainable Agriculture Practices (IAES Program 7) (RPAs 101, 102, 104, 111, 112, 132, 133, 135, 215). IAES Program 7 contributes to REE GOAL 4 and is the IAES’s second largest research program area. This program area has 21 active research projects and encompasses approximately 15.11 SY of faculty research contribution.

RPA	SY	PY/TY	Amount
101	1.72	0	141,916
102	4.35	2.24	953,313
104	.73	1	196,516
111	2.66	1.03	1,317,646
112	.5	0	841,741
132	0	0	0
133	3.35	1.92	548,930
135	0	0	0
215	1.8	1	713,621
Total	15.11	7.19	4,713,683

Allocated Resources KEY THEME 8: Pollution control and natural resources (IAES Program 8) (RPA 605). IAES Program 8 represents the IAES’s contribution to REE Goal 4 and includes 2 research projects and approximately .58 SY of faculty research effort.

Allocated Resources IAES Program 8:

RPA	SY	PY/TY	Amount
605	.58		140,645
Total	.58		140,645

REE GOAL 5: ENHANCED ECONOMIC OPPORTUNITY AND QUALITY OF LIFE FOR AMERICANS

KEY THEME 9: Economic Enhancement, Improved Quality of Life (IAES Program 9)
Performance Goals:

1. *To improve the social and economic well-being of rural communities in Idaho by providing data and information on local demographics, interactions between components of the community, and planning for economic growth of the geographic unit;*
2. *Determine how work factors (e.g. time, support, and control) enhance or impede family performance and well-being;*
3. *Explain the consequences of family/work interaction for family members and workplace;*
4. *Increase understanding of parents’ feeding of infants and young children and the development characteristics of eating skills for young children;*
- and 5. *Increase understanding of culture and the mealtime environmental factors that facilitate development of self-feeding skills.*

The primary concern of policy decision makers and community planners is the changing housing circumstances of the U.S. population. This includes homeless, single parents with young children, and older adults. While the current and future housing problems of the group represent a challenge to policy makers and community planners at all levels of government, the overlooked group in the maturing population is the 40 to 60 year olds. This study has determined the factors older people consider in their decision of where to live and the bole of housing costs in their decision.

A comprehensive data set was developed to assess the motivation that cases older people (50 years and over) to immigrate to Idaho and how they have developed a “sense of place” in their new community. This information is important to community leaders to assist them in their decision to prepare for older immigrants to their communities. Proper planning will increase senior citizen migration to Idaho small communities with a potential \$3 million of new income annually.

Allocated Resources KEY THEME 9: Economic Enhancement, Improved Quality of Life (IAES Program 9) (RPAs 608, 801, 802, 803, 901, 902, 903). IAES Program 9 contributes to REE GOAL 5. This program area includes 4 IAES research projects and accounts for approximately 3.1 SY of faculty research effort.

RPA	SY	PY/TY	Amount
608	1.38	0	65,465
801	.1	0	8,091
802	0	0	0
803	1.37	0	124,524
901	0	0	0
902	0	0	23,132
903	.25	0	100
Total	3.1	0	221,312

Summarized Personnel and Allocated Resources by Federal REE Goal

Goal	SY	PY/TY	Amount
1	39.19	30.14	15,042,992
2	2.62	2	1,578,283
3	3.09	0	885,908
4	15.69	7.19	4,854,328
5	3.1	0	221,312
Total	63.69	39.33	22,582,823

B. STAKEHOLDER INPUT PROCESS

Overview: There have been considerable changes in the process used to acquire stakeholder input compared to our original POW. However, these changes were made prior to this reporting period. During 2004, we did not make significant changes to our stakeholder input process and the process described below reflects our current procedures which were used during this reporting period. Specific activities for collecting input during the past FY and the steps taken to consider this input by IAES are summarized at the end of this section.

Process: Within CALS, the IAES relies on the avenues of stakeholder input employed across the college. The IAES POW was derived with the input from, and has been shared with, a broad cross-section of stakeholders in Idaho. In brief, the major stakeholder groups providing input regarding the IAES's spectrum of research activities (as reflected in the portfolio of IAES research projects and the POW) include:

- In 2001, CALS began reorganization of the Agricultural Consulting Council, our primary stakeholder organization, into a smaller more focused and dedicated group that is known

as the “Dean’s Advisory Board”. This new college level advisory group was instituted in 2002. Many members of the ACC have transitioned into serving on the departmental advisory committees that have been formed in all the academic departments of CALS (see below).

- Idaho Cooperative Extension has citizen advisory groups in 42 of Idaho’s 44 counties. These committees, which are composed of a very diverse and broad mix of public interests, provide input regarding extension and research program priorities from the county perspective.
- Idaho’s 17 agricultural commodity commissions and organizations provide advice specific to commodity based programs and appropriate disciplines and departments within the college. In addition, IAES researchers provide leadership and most of the content for several major commodity schools that are presented annually in the state. The commodity schools are well attended by stakeholders from Idaho and the region. These “schools”, while primarily conducted as major outreach/technology transfer events to provide the latest research results to stakeholders, also serve as major sources of stakeholder input to IAES regarding research priorities and directions. Commodity schools are annually conducted for potato, cereal, sugar beet science and technology. As an example, the University of Idaho Potato School is a three-day event that annually attracts approximately 1,200 registrants who come from Idaho, the PNW region, virtually all other states involved in potato production as well as representatives from approximately 25-30 foreign countries.
- Beyond the commodity schools mentioned above, annually or semi-annually IAES faculty, both from campus and from out-state locations, actively organize and participate in “field days” at each of the IAES’s twelve off-campus research and extension centers as well as a number of additional more focused “program” tours such as: weed identification, ecology, management and technology at several locations, potato storage research open-house, pomology program open-house and field day, and tours of the IAES’s crop genetic improvement research programs for beans, potatoes, wheat, and the oilseed crops of rapeseed and mustard. Again, these stakeholder events function as educational/technology transfer events as well as opportunities for stakeholder interaction. In addition, annually many IAES faculty are involved with organizing symposia that address special topics.
- The IAES research project portfolio and an abbreviated version of the POW is annually shared and discussed with representative from the executive branch of state government including the Governor’s Office, the Dept. of Agriculture, and to a lesser extent, the Dept. of Environmental Quality, Dept. of Health and Welfare, and the Dept. of Commerce as well as being shared/discussed with key committees and leadership of the Idaho Legislature.
- The faculty, staff, and students (both graduate and undergraduate) of the college have a vested interest in the development of appropriate research programs of high quality that are responsive to needs of the state and region. This university stakeholder group is an important source of valuable input to the IAES and play a major role in IAES program development and delivery. In the course of performing their research, the majority of researchers in the IAES have frequent and substantive contact with stakeholders in their research programs as has been indicated above. An array of inputs regarding program

directions and priorities are more informally received in this manner and are subsequently considered and often implemented.

The college has also mandated the formation of advisory committees for each of the eight academic departments in CALS. As of 2002, all departments of CALS established advisory committees. These committees (ranging between 6 to 12 members) are comprised of representatives from a broad base of stakeholders sharing interest in the disciplines, programs, and strategic plans of the departments. These committees are now serving as a significant additional source of stakeholder input for the IAES and CALS. In addition, once a year in on-campus meetings the departmental advisory committees meet with the CALS and IEAS leadership as well as with the Dean's Advisory Board on program priorities and directions for the college, the experiment station and the departments.

Summary of FY 2004 activities: During this reporting period, the IAES Director, CALS Dean, or their designees met at least once with each of Idaho's commodity commission group. In general, these meetings were conducted to determine priorities for research programs funded by the commissions. However, we also solicited this information for the purpose of establishing our college and departmental signature programs (see below in 'Program Review Process' section), for a re-prioritization process currently ongoing in CALS. CALS administration also met four times with the Deans Advisory Board including twice off campus. One of these meetings was a joint meeting with representatives of the department advisory boards. IAES researchers held numerous field days across the state and several of these were attended by the IAES Director or the Dean.

C. PROGRAM REVIEW PROCESS

Overview: In FY2004, no significant changes were made to our existing process which is described below.

Existing Process: All faculty in CALS or other colleges within the UI holding a research appointment in the IAES, are required to have an active, approved research project that reflects their major research emphasis. Hatch projects are expected to address problems relevant to Idaho's agriculture with either a regional or national scope of importance. Project outlines must be reviewed internally by a minimum of two colleagues with expertise in the area of research, the investigator's Department Head and a minimum of two external experts in the area not affiliated with the UI.

Research activities of the IAES that contribute to organized multi-state projects/programs approved by CSREES are designated as Multi-state (Regional) Research Projects. In the Western Region, these multi-state projects must be reviewed by a maximum of four outside peer reviewers in addition to the overall regional multi-function committee (RCIC-see below) appointed by the Western Association of Agricultural Experiment Station Directors (WAAESD). The RCIC reviews the proposal and makes recommendation to the WAAESD and, if approved, transmits the project to CSREES.

Plans for FY2005: The relative roles of various research programs affecting agriculture and related areas have not changed dramatically since submission of our 1999-2004 POW. However,

for the past 18 months, CALS has been undergoing an internal process to prioritize and identify ‘signature programs’ in research, teaching and extension. The completion of our process was delayed to allow the UI to complete a similar process for the entire institution, but is expected to be completed soon. Based on our discussions and on stakeholder input, our current signature programs (pending completion of the process), include: 1) Environmental and Economically Sustainable Crop and Livestock Integrated Systems, 2) Agricultural and Food Based Process and Product Innovation, 3) Managing Soil, Air, Water and Biological Resources, 4) Human Health, Nutrition and Food Safety, Disease Prevention, 5) Urban Environment and Small Acreage Agriculture, 6) Youth Education and Development, Individual and Family Well-being, and 7) Community Development. It is likely that existing procedures for assessing merit of individual research programs using Hatch Formula Funds will be retained, but that distribution of these funds will be changed so that research programs can be aligned with the signature programs, once they are formalized. We anticipate the progression toward larger multi-investigator team research programs and away from individual projects. This will require a more extensive peer review system because of the multi-disciplinary nature of the research proposals anticipated. No changes are anticipated for the review of multi-state research projects.

D. EVALUATION OF THE SUCCESS OF MULTI AND JOINT ACTIVITIES

General Evaluation Process: Research activities of the IAES that contribute to organized multi-state projects/programs approved by CSREES are designated as regional research projects. Regional/multi-state research supported by Section 3(c)3 of the Hatch Act is appropriate for support of research when: 1) the research focuses on a specific and important problem of concern to two or more states, and 2) the research is planned and conducted as a concerted effort in which the participating scientists are mutually responsible for accomplishing the objectives. Multi-state regional research projects outlines in which the UI participates are subject to peer review and approval as stated in the policy manual of WAAESD or those of the other SAES regions if the multi-state project originated outside of the western region.

In the western region, multi-state regional research fund projects must be reviewed by a maximum of four outside peer reviewers in addition to the Research Coordination and Implementation Committee (RCIC) which is appointed by the WAAESD in cooperation with the Western Extension Directors and Western Academic Program Directors. RCIC reviews the proposal and makes a recommendation to the WAAESD. If the proposal is approved, the WAAESD Chair, with assistance from the WAAESD Executive Director’s Office transmits the project to CSREES. The RCIC also appoints Administrative Advisors to guide and administer projects and committees.

1. UI involvement with critical issues of strategic importance: Because of the size of our institution and relatively remote location, faculty at the UI have traditionally been very active in multi-state programming for a number of years. During this reporting period, the IAES’s multi-state regional research project portfolio involves participation of 23 IAES faculty in 18 different approved multi-state research projects. Of these, eleven projects originated in the western region, three in the north-central region, two in the southern region, and two in the northeast region. In virtually all cases, IAES faculty participation in the multi-state research program has provided benefit to the IAES and to the citizens of Idaho as well as to the multi-state project and

Nation in terms of productivity and providing research capacity that otherwise would not be possible. The strategic significance of this research is indicated by their close alignment with CALS signature programs (determined in part from stakeholder input as described above) and with the national REE goals as follows:

REE Goal 1: An Agricultural Production System that is Highly Competitive in the Global Economy

- W-112: Reproductive Performance in Domestic Ruminants
- W-188: Characterization of Flow and Transport Processes in Soils at Different Scales
- NC-136: Genetic Manipulation of Sweet Corn Quality and Stress Resistance
- W-006: Plant Genetic Research Conservation and Utilization
- IR-4: Pest Control Agents for Minor Uses

REE Goal 2: A Safe and Secure Food and Fiber System

- S-295: Enhancing Food Safety through Control of Food-Borne Disease Agents
- NC-136: Improvement of Thermal Alternative Processes for Foods

REE Goal 3: A Healthy, Well Nourished Population

- W-1122: Beneficial and Adverse Effects of Natural Bioactive Chemicals on Human Health and Safety
- W-150: Genetic Improvement of Beans (*Phaseolus vulgaris L.*) for Yield, Pest Resistance and Food Value
- W-181: Modifying Milk Fat Composition for Enhanced Manufacturing Qualities and Consumer Acceptability
- NC-131: Molecular Mechanisms Regulating Skeletal Muscle Growth and Differentiation.

REE Goal 4: Greater Harmony Between Agriculture and the Environment

- W-1185: Biological Control in Pest Management Systems of Plants
- W-1147: Managing Plant Microbe Interactions in Soil to Promote Sustainable Agriculture
- W-128: Microirrigation Technologies for Protection of Natural Resources and Optimum Production
- NC-2003: Impact Analysis and Decision Strategies for Agricultural Research
- W-1128: Reducing Barriers to Adoption of Microirrigation
- S-1000: Animal Manure and Waste Utilization, Treatment and Nuisance Avoidance for a Sustainable Agriculture: Odor and Gas Emissions for Confined Animal Feeding Operations

REE Goal 5: Enhanced Economic Opportunity and Quality of Life for Americans

- NE-1011: Rural Communities, Rural Labor Markets, and Public Policy
- W-192: Rural Communities and Public Lands in the West: Impacts and Alternatives
- W-167: Family and Work Identities During Times of Transitions

Currently, the IAES is spending over 27% of its Federal Hatch formula funds (\$589,420) in support of these Multi-State Research Projects plus \$462,897 in state funds. The following figures detail the IAES resource allocation to multi-state activities:

Multi-state Summary of Resources* Allocated by Federal REE Goal

Goal	SY	PY/TY	Amount
1	3.86	2	616,211
2	.45	0	63,052
3	.40	0	16,393
4	2.43	0	243,004
5	.98	0	48,407
Total	8.12	2	987,067

*** Includes federal appropriation of \$589,420 and state dollars of \$462,897.**

2. Did the planned programs address needs of underserved/underrepresented populations?

Several of the multi-state projects directly influence these populations. Specifically, Idaho’s two largest minority populations are faced with issues influencing their physical health as well as their financial well-being. For example, in Idaho, these minority populations frequently live in rural communities and in single parent households. Three research projects (NE-1011, W-192, and W-167) directly address these issues.

3. Did the programs describe the expected outcomes and impacts?

All investigators participating in multi-state activities are required to describe the anticipated results of their work specifically, as well as the overall accomplishments, outcomes, and impacts of the team. During FY2004, Idaho investigators contributed significantly to the multi-state research groups they participated in. Several notable examples include:

An IAES investigator serving as Chair of **W-150** participated in the Western Regional Bean Trial and the National Cooperative Dry Bean Nursery. This participant provided approximately 30 entries and also participated in development and release of the first anthracnose resistant pinto bean germplasm line, USPT-ANT-1 with USDA-ARS and Michigan State University researchers. Idaho’s participant in **NC-136** conducted a study of 12 seed treatments on two super-sweet corn genotypes at 16 sites in the U.S. and one in Japan. His work identified several effective seed treatment mixtures that provided high field performance and can be used by seed companies to ensure high and uniform stands of sweet corn in the field. The IAES representative to **W-006** continues to evaluate wheat germplasm for desired traits such as biotic resistance/tolerance, abiotic tolerance, end-use quality, and is involved in documenting use of wheat germplasm by public and private programs/companies and individuals. In 2003, his research contributed to the report on the use of accessions from the national plant germplasm system by public programs and private individuals/companies. Idaho's contribution to **W-1147** is to focus on reducing dependence on chemical pesticides and to develop biodegradable microbial pesticides. Using the bacterium, *Pseudomonas corrugata*, as a biological seed treatment for fungal root disease, increased legume yields by 45%.

An IAES member on **W-192** worked jointly with researchers and extension personnel from other western states (Idaho, Oregon, Nevada, Wyoming New Mexico) to develop ranch-level and regional economic modeling protocols. Idaho economic models and social assessments were used to provide an analysis of public land policy alternatives in Owyhee County for county officials and the Bureau of Land Management. These same models were used with others in

Oregon and Nevada to provide an analysis of ranch-level impacts of alternative sage grouse management strategies.

4. Did the planned programs result in improved effectiveness or efficiency?

Yes. Several examples include: An IAES researcher, working with **W-112**, studies the regulation and function of the uterine Mx genes. He has incorporated this protein into an early pregnancy assay that was licensed and patented. This pregnancy test, once marketed, would greatly enhance reproductive efficiency in animal agriculture industry and also address early embryonic losses.

An Idaho researcher on **W-128** evaluates soil moisture sensing equipment and has determined the most effective use of sensors and data loggers in irrigation scheduling. This information allows growers to schedule irrigation and manage irrigation systems for optimum yield and quality. He has presented this information to alfalfa growers in Oregon, Washington and Wyoming.

An Idaho agricultural economist on **NC-2003** reported his investigation of the economic and environmental impacts of using brassicaceae plant tissues as green manure to control nematodes. For example, the gross annual benefit to Idaho sugar beet producers is estimated at \$13.9 million per year and potato producers at \$18.5 million. In addition, the annual reduction in active toxic material on potato fields by eliminating the use of Tellone-II and Metam Sodium are estimated at over 5.5 million pounds. This investigator also estimated that organic nitrogen released from the brassicaceae tissue will reduce nitrogen use on potatoes by about 50 percent and on sugar beets by about 92 percent and significantly reduce nitrate leaches.

An IAES investigator conducting research under **NC-136** developed a generalized fluid transport equation that predicts that fluid transport in biopolymeric materials differs in rubbery and glassy states vs. in the vicinity of glass transition. Newly designed NMR experiments for imaging moisture movement during drying of pasta validated these predictions. Solution of the fluid transport equation using computer simulations, helped to obtain insight into the involved physical mechanisms and develop optimum drying strategies, which cause minimum crack formation, greater moisture reduction and reduced energy consumption.

E. MULTI-STATE EXTENSION ACTIVITIES

Not applicable.

F. INTEGRATED PROGRAM ACTIVITIES

Traditionally, the IAES and CALS have placed a strong emphasis on the integration of research and extension programming. There are formal regional education, extension and research integrated activities (ERAs) that typically form a committee to meet regularly to plan, conduct and evaluate projects. The RCIC reviews and approves the work of the ERAs in the western region (WERAs). During this reporting period, 29 IAES investigators participated in 27 such integrated ERA committees.

In addition, many faculty have joint appointments in research and extension to provide the closest possible integration of these functions. By virtue of our program planning process, faculty with research and extension appointments come together to plan and implement programs based on identified needs. The IAES has 70.35 SY's distributed over approximately 106 faculty

members with split research and extension appointments. Additional integrated activities derived from stakeholder input are detailed in the next section. These are typically manifested in a number of “outreach”/technology events during the year that are primarily conceived, organized, and presented by IAES faculty. Many of the IAES faculty involved in these activities have joint research/extension appointments, but many have no formal extension appointment.

Appendix C

**U.S. Department of Agriculture
Cooperative State Research, Education, and Extension Service
Supplement to the Annual Report of Accomplishments and Results
Multistate Extension Activities and Integrated Activities
(Attach Brief Summaries)**

Institution: University of Idaho
State: Idaho

Check one: Multistate Extension Activities
 Integrated Activities (Hatch Act Funds)
 Integrated Activities (Smith-Lever Act Funds)

Actual Expenditures

Title of Planned Program/Activity	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
Goal 1: <i>An Agricultural Production System that is Highly Competitive in the Global Economy</i>	329,373	289,445	281,737	310,736	334,000
Goal 2: <i>A Safe and Secure Food and Fiber System</i>	48,656	49,031	46,771	43,994	35,100
Goal 3: <i>A Healthy, Well Nourished Population</i>	7,807	7,227	5,247	7,188	19,700
Goal 4: <i>Greater Harmony Between Agriculture and the Environment</i>	22,267	60,773	81,534	81,158	107,800
Goal 5: <i>Enhanced Economic Opportunity and Quality of Life for Americans</i>	97,779	98,301	89,825	56,405	5,000
Total	<u>505,882</u>	<u>504,777</u>	<u>505,114</u>	<u>499,481</u>	<u>501,600</u>


 Director 5/23/05
 Date

Form CSREES-REPT (2/00)

End of Document