

2017 Utah State University Combined Research and Extension Plan of Work

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I. Plan Overview

1. Brief Summary about Plan Of Work

Plan Overview

Brief Summary of "Plan of Work"

2017 Plan of Work

This plan of work encompasses five major program areas consistent with the NIFA-stated goals: (1) Global Food Security and Hunger, (2) Climate Change and Natural Resource Use, (3) Sustainable Energy, (4) Food Safety, and (5) Obesity, Nutrition and Community.

Global Food Security and Hunger

The objective of this goal is to enhance global food security through productive and sustainable agricultural systems. This is not meant as an abandonment of past agricultural practices or agricultural systems. It requires an expanded view of agriculture, not an abandonment of agriculture. We can make real progress in improving the standard of living, not only in the U.S., but throughout the world. In order to feed growing populations, we must develop more stress-resistant crops and ensure an improvement in overall productivity of livestock. Scientific discoveries that result in heat, drought, and saline-resistant plants will allow farmers to remain competitive in world markets, while contributing to farm production throughout the world. Future investigations will range from traditional crop and livestock breeding, but will also emphasize genomics. Crops will be produced which rely less on man-made inputs like fertilizer and fuels, and more on gene manipulation. However, it will require more than laboratory work as these improved plants must be field-tested, both at home and abroad. More focus will need to be given to the "science" of agriculture. Animals must be made more efficient in the use of existing or even altered forage resources.

Climate Change and Natural Resource Use

Agriculture is climate dependent. Consequently, any changes in the environment such as climate change will require that plants and animals adapt to or mitigate climate change. Agriculture can be at the forefront in adapting to new climate realities, as well as mitigating many of the influences of climate change. The concept of climate change is not new to Utah producers. Utahans have adjusted to changes in water and temperature for many years. Yet, there is more that can be done to enhance the productive environment of both plants and animals. Animals can become more efficient in the consumption of forages through appropriate breeding practices and tailoring livestock to meet forage conditions. While there is great vigor in many breeds, some are clearly not appropriate for the sparsely vegetative state of much of Utah's land. Efficiencies can be improved through genetic modifications as well. Plants can be made more resistant to drought and salinity through traditional breeding practices, and through the application of genomics. Water will become an even more critical part of agricultural production processes as it becomes less available and/or the quality becomes less suitable for agriculture. The idea of water dependency under climate change cannot be over emphasized as populations increase in the last and water shifts from agricultural to municipal and industrial uses. Public/private land interface is another area requiring extensive research and outreach. Sixty percent of the total land available in the West is public land, owned by either the state or the federal government. This presents unique challenges to the West that most of the rest of the country cannot begin to understand.

Sustainable Energy

Agriculture contributes to the energy issue in two, often conflicting, ways. First, traditional production

methods rely heavily on synthetic fertilizers and fuels. Second, agriculture provides a possible source for ethanol products. Reliance on synthetic fertilizers must be lessened, either through improved plant productivity or by adapting plants to make their own fertilizer or make better use of that provided through livestock production. Agriculture can also contribute to the existence of fuels, though great care must be taken to not disrupt our food supply and agricultural commodity prices. There are ways in which adjustments can be made to plants and animals such that less synthetic fertilizer will be used and more crop residues made fit for energy production, but these adjustments require extensive research and outreach.

Food Safety

Food safety is a necessary area of emphasis as food and fiber pathogens increasingly cost the U.S. economy significant lost time and increased health expenditures. New diagnostic tools need to be developed to rapidly test food products for pathogens. But even more basic is the need to provide a safe system through which food can be transferred. Some of that will involve better identification of food and fiber flows within the U.S. and throughout the world. Traceability will become increasingly important but new, less costly methods of food chain identification must be developed. Pathogens can enter the food supply at any point during the production, harvest, processing, and transporting process. It is critical that the U.S. consumer not have to question if their food is safe. Great strides have been made in protecting the food system, but additional research and outreach are required. The American people need to have confidence in the safety of its food supply, which sometimes is a difficult task given the extensive processing that occurs. It must always be remembered that America has the safest food supply the world.

Childhood Obesity, Nutrition and Community

It seems strange to speak of nutrition in a country that has such a remarkable food system, but nutrition is a significant problem even in this country--but it is a problem of both scarcity and plenty. Much of the most vulnerable populations, such as young children and aging adults, are subject to food scarcity. At the same time, one can scarcely turn the television on or read a newspaper without seeing a story regarding the high level of obesity in this country. As modern life becomes easier due to the enormous advances we have experienced in technology, obesity problems seem to grow. Our common goal should be to allow our children to live healthy and productive lives. Hence, adequate nutrition becomes a problem for those both affluent and those in poverty within the U.S. and others scattered throughout the world that do not have enough food to eat to avoid disease and malnutrition. Because the public university system has been so successful in moving agriculture and food technologies forward, they should also be the means to make the food selections more nutritious. In addition to changing the nutritional quality of food, educational efforts to teach people the consequences of obesity must become more effective. Community is the background of this that takes place with respect to obesity and nutrition. Without a sense of community, it would be difficult, if not impossible, to solve the nutrition and obesity problem of this country.

Summary

This plan of work (POW) has been put forth to respond to the NIFA, USDA goal areas. The UAES and UCES is attempting to respond to this change of focus and it is critical that such a transition take place. Future competitive funding will be confined to these five areas. More emphasis will be placed on interdisciplinary work in order that a more holistic approach is taken in solving the many problems facing U.S. and world consumers. It is anticipated that research, except for that most basic, will have an outreach component to fully take advantage of the special training system already in place within the U.S. land-grant research and outreach system. Competitive funding opportunities will require an outreach component, in addition to a research component.

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

Year	Extension		Research	
	1862	1890	1862	1890

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

Year	Extension		Research	
	1862	1890	1862	1890
2017	110.0	0.0	53.9	0.0
2018	102.0	0.0	53.9	0.0
2019	90.0	0.0	53.9	0.0
2020	90.0	0.0	53.9	0.0
2021	90.0	0.0	53.9	0.0

II. Merit Review Process

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

- Internal University Panel
- External University Panel
- Combined External and Internal University Panel
- Expert Peer Review

2. Brief Explanation

Merit Review Process - Extension Plan: The cooperative extension service merit review process will involve a review by the University of Wyoming, University of Arizona, and the University of New Mexico extension services. These institutions will review the program components suggested in each program area utilizing extension faculty qualified as specialists with significant program experience in the area being reviewed. In turn, Utah State University Cooperative Extension Service will review the work from these three institutions.

Scientific Peer Review Process - Agricultural Experiment Station: The scientific peer-review process within the agricultural experiment station involves two steps. The first step includes a review by scientists as requested by the principal investigator (PI). Prior to submission to the experiment station, the PI's department head also reviews and signs off on the proposal. Once the proposal reaches the station, two additional scientific peer reviews are obtained from subject matter experts, either from other on-campus faculty (if the expertise exists) or off-campus faculty (if on-campus expertise does not exist). The reviews are returned to the experiment station and the PI's are subsequently asked to respond to issues raised by these reviewers. The PI must then modify her/his proposal to address the issues raised by the "outside" reviewers before resubmitting it to the experiment station for funding consideration. The practice of sending reviews off-campus to qualified subject matter experts has increased over the past five years.

III. Evaluation of Multis & Joint Activities

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

Identified issues of importance to research, program development and delivery as outlined by NIFA, USDA, will be reviewed periodically by collaborators. Collaborators include federal and state agencies, private and non-profit groups, geographically contiguous state extension and experiment stations, university academic departments, and the stake holders throughout the state. Research and Extension leaders will then establish a prioritized listing of critical issues of strategic importance in Utah that fit within the five NIFA goal areas, which will be routinely reviewed and addressed in the plan of work.

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

Under-served and under-represented populations as one group have participated in the issue identification process in the past that was considered in the development and orchestration of the Utah plan of work. Within the new five goal areas, the developed plan is designed to meet the identified stakeholder issues and due consideration of the needs of under-represented and under-served population are addressed in the plan. Priorities established in the plan will be routinely reviewed with under-served and under-represented audiences

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

The planned programs specifically describe the expected outcomes and impacts under each planned program area consistent with the required outline. The outcomes and impacts are enumerated as specifically as possible. It is expected that further refinements in the outcomes and impacts can be made as more data become available.

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

The planned programs will enhance program effectiveness and efficiency by setting specific objectives and associated outcomes and impacts that are measurable. Adjustments to the plan will be made based on outcomes achieved and re-targeting of programs to serve the needs of the clientele served.

IV. Stakeholder Input

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

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

Brief explanation.

Input from stakeholders will continue to be sought by each county who will hold sessions with stakeholders through the year to obtain input into the plan and propose revisions. In addition, stakeholder groups will be utilized to provide further clarification to the new plan and its five major goal areas.

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

1. Method to identify individuals and groups

- Use Advisory Committees
- Use Internal Focus Groups
- Open Listening Sessions
- Use Surveys

Brief explanation.

Extension county offices and the Agriculture Experiment Station will share with advisory committees through open meetings, focus groups and surveys the current plan of work to ascertain its relevance to these stakeholder groups. Modifications to the plan that are suggested by these groups from the methodologies indicated will then be considered in subsequent plan revisions. Still, this will be done generally within the five program areas as suggested by NIFA, USDA.

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

1. Methods for collecting Stakeholder Input

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

Brief explanation.

A variety of methods will be used to collect stakeholder input as noted above, though not all would necessarily be used in the same year. Specific meetings will be held with appropriate stakeholder groups to solicit their input.

3. A statement of how the input will be considered

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

Brief explanation.

Input from the various stakeholders will be used in helping set research and extension agendas within the five NIFA, USDA, goal areas. Stakeholders have included research scientists, community leaders, community citizens, politicians, underserved populations, and extension faculty and staff. Therefore, the areas targeted in this plan of work will reflect the views of a broad set of stakeholders, including the federal government, and will provide a valuable guide to the programs selected for emphasis.

V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	Global Food Security and Hunger
2	Climate Change and Natural Resource Use
3	Sustainable Energy
4	Childhood Obesity, Nutrition and Community
5	Food Safety

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Global Food Security and Hunger

2. Brief summary about Planned Program

The objective of this goal is to enhance global food security through productive and sustainable agricultural systems. This is not meant as an abandonment of past agricultural practices or agricultural systems. It requires an expanded view of agriculture, not an abandonment of agriculture. We can make real progress in improving the standard of living, not only in the U.S., but throughout the world. In order to feed growing populations, we must develop stress-resistant crops (particularly with respect to higher temperatures and less water) and ensure the overall productivity of livestock. Scientific discoveries that result in heat, drought, and saline-resistant plants will allow farmers to remain competitive in world markets, while contributing to farm production throughout the world. Future investigations will range from traditional crop and livestock breeding to newly mastered genomics. Crops will be produced which rely less on man-made inputs like fertilizer and fuels, and more on gene manipulation. But it requires more than laboratory work as these improved plants and must be field-tested, both at home and abroad. More focus will need to be given to the "science" of agriculture. In addition, animals must be made more efficient in the use of forage resources.

3. Program existence : Mature (More than five years)

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

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

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

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
123	Management and Sustainability of Forest Resources	4%		5%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		10%	
202	Plant Genetic Resources	0%		5%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		5%	
205	Plant Management Systems	47%		10%	
211	Insects, Mites, and Other Arthropods Affecting Plants	5%		5%	
213	Weeds Affecting Plants	0%		5%	
215	Biological Control of Pests Affecting Plants	0%		5%	
216	Integrated Pest Management Systems	10%		5%	
301	Reproductive Performance of Animals	0%		10%	
302	Nutrient Utilization in Animals	0%		5%	
304	Animal Genome	0%		10%	
307	Animal Management Systems	32%		10%	
603	Market Economics	2%		10%	
	Total	100%		100%	

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

1. Situation and priorities

Livestock and livestock products comprise over 70% of the agricultural cash receipts in Utah. While the main focus of this planned program is animal nutrition and animal management systems, other, often diverse, knowledge areas are also associated with this planned program area. With such a large proportion of agricultural receipts coming from livestock, it is imperative that research and educational efforts be directed toward solving some of the major problems associated with livestock: reproduction rates, rates of gain, health, and environmental concerns.

In the Intermountain West and Utah, plant production primarily serves the livestock industry, though plant production is also becoming a more critical part of the urban scene as well, i.e., horticulture and landscaping. Whether for eventual use as a livestock feed or for landscaping, plant production comprises a significant portion of the state's and region's agricultural complex. Priorities include (a) continuing development of new grain, grass, and alfalfa varieties to help the livestock sector to remain economically viable and to do so in an environmentally friendly manner and (b) expansion of "native" landscapes in urban settings. The overall goal of this research is to develop plant materials that are ideally suited to the Intermountain region's climate. One of the basic parts of this planned program is the development of

enhanced plant genetic material, primarily through traditional crop breeding programs. In addition, the entire plant management system needs to be improved to gain the most from the other plant research that is done. Work is underway to control plant pests, including weeds, insects, pathogens, etc., especially in the area of augmented integrated pest management (IPM) systems.

Work in genetics, particularly through biotechnology, is a significant thrust, particularly with respect to livestock. Efforts to enhance plant, animal, and microbial efficiencies are central to the continued economic and physical viability of agriculture and food and fiber production. With prices increasing more slowly than costs, the primary hope for existing agricultural producers is that there will be technologies developed that will enhance productivity. With productivity gains, producers can remain economically viable.

Economic analyses are critical to the adoption of various production and conservation practices. A primary area of focus will be that of marketing and distribution practices, including international trade. Economic models that are based in theory must be developed and tested using quantitative methods. Only if new practices can be shown to be economically feasible will they be adopted by producers.

In general, UAES scientists direct their work towards extension specialists and peer reviewed journals, though many have a joint appointment with CES. CES's audiences include peers, county agents, federal and state organizations, producer groups, and the general public. County agents work cooperatively with federal, state, and local governments, citizen groups, and the public to address agricultural economics issues in their areas.

2. Scope of the Program

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

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

1. Assumptions made for the Program

1. Animal production is an important industry for Utah's economy and for aesthetic values.
2. The large amount of public lands in the West will slowly be reduced as competing users take advantage of these lands.
3. Other means of feeding large quantities of livestock (principally cattle) will have to be developed as public lands become less available.
4. Alternative feeding and management strategies exist or can be developed capable of assisting in maintenance of profitability for all sizes of livestock operations.
5. Plant production in Utah will continue to remain very important with respect to economics, space, and aesthetics.
6. There is a need for greater efficiency in plant and animal production.
7. Forage (including grasses, and alfalfa) and grain crops will continue to be processed and consumed locally, as well as exported to surrounding states.
8. Plant and animal diseases and pests are major detriments of profitability and can be prevented.
9. The potential for biotechnological improvements exists in both plants and animals.
10. Sufficient funds will exist for the adoption of new biotechnology processes as they become available.
11. Sufficient physical (laboratory and land) space will remain available to complete the planned

program.

12. Product differentiation can bring about enhanced prices and provide enhanced profits.
13. Farm-level receipts can be increased by decreasing costs or increasing prices.
14. International trade benefits both sides of the trade and enhances each economy's output, though not necessarily uniformly across all industrial segments.
15. Producers can make changes in their management style to reduce risk and enhance net earnings.
16. Niche markets are becoming available that would enhance profitability, particularly for early adopters, but often require animals and plants with exact specifications.
17. The regulatory environment creates a disproportionate burden for businesses and small manufacturers.
18. Small manufacturers are less likely to be aware of best manufacturing practices, innovative application of new technologies, and fresh approaches to improved production efficiencies.
19. It is often difficult for owners and managers of smaller companies to find high-quality, unbiased information, advice, and assistance.
20. Consumer interest in locally-produced food products exists.
21. An understanding of advanced economic and marketing principles is very important for producer survival.
22. Business, entrepreneurship, and economic development programs can help Utah communities, businesses and individuals make choices regarding growth, employment, and development opportunities and options.
23. Field staff can and will actively participate in providing training and entrepreneurship education opportunities.
24. Training and one-on-one consultation are the most effective means of developing entrepreneurs and emerging businesses.
25. Funding will remain in place through the study period.
26. Sufficient faculty and staff will remain available to work in this area to make substantial progress.

2. Ultimate goal(s) of this Program

1. Enhance animal and plant genetic resources.
2. Improve the reproductive performance of animals.
3. Enhance nutrient utilization in animals.
4. Strengthen animal and plant management systems.
5. Reduce effects of animal and plant insects, diseases and toxins.
6. Enrich bio-energy development from animals and plants.
7. Educate existing and potential animal producers so they can be competitive and remain on the farms and ranches in Utah when so desired.
8. Improve plant biological efficiency and ability to deal with abiotic stresses.
9. Protect crops and plants from weeds and other pests without causing other damage.
10. Augment existing IPM systems.
11. Utilize genomics to enhance animal and plant efficiencies and production.
12. Improve marketing and distribution practices for agricultural producers.
13. Enhance profits through international trade and development.
14. Strengthen farm- and ranch-level net returns.
15. Create jobs in agriculture and related sectors that will survive economically.

V(E). Planned Program (Inputs)

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

Year	Extension		Research	
	1862	1890	1862	1890
2017	23.0	0.0	23.0	0.0
2018	23.0	0.0	23.0	0.0
2019	23.0	0.0	23.0	0.0
2020	23.0	0.0	23.0	0.0
2021	23.0	0.0	23.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

1. Conduct research experiments with livestock and plants and plant material.
2. Publish studies and make presentations related to plant propagation and livestock reproduction and plant and livestock production.
3. Conduct workshops and meetings to educate local, state, and regional stakeholders concerning progress in producing livestock and plants that are economically viable and environmentally friendly.
4. Provide new methods of livestock pest control and disease prevention.
5. Release new plant varieties relative to this program area under plant variety protection (PVP) status.
6. Expand use of Integrated Pest Management (IPM).
7. Provide pest diagnostic assistance and management information to county agents, state and federal partners, commercial agriculture and horticulture producers, and the general public through the Utah Plant Pest Diagnostic Laboratory.
8. Coordinate efforts with other states and the Western Region Pest Management Center (WRPMC).
9. Enhance the USU Master and 4-H Junior Master Gardener Programs.
10. Utilize multiple demonstrations/applied research plots to manage weeds in agronomic crops with results reported at field days, workshops, or annual meetings.
11. Conduct research experiments and develop theories that can be used to enhance plant and animal productive efficiencies through the use of genomics.
12. Publish studies related to these areas of concern.
13. Conduct workshops and meetings for other scientists involved in this area of research.
14. Develop applications for the research on plant and animal genomics to directly benefit producers and other scientists.
15. Conduct market tests to determine the price premium associated with alternative production and marketing programs.
16. Build models to quantify the impacts associated with international trade.
17. Develop risk reduction models for agricultural producers.
18. Analyze firm-level decisions to identify specific changes that might be made on individual farms and ranches that would enhance net returns.
19. Provide outreach to agriculture businesses, small manufacturers, and entrepreneurs to provide educational training and in-depth information on: small business management, home-based businesses, main street community programs, business retention and expansion, rural and heritage tourism, rural and economic development activities, E-commerce programs, community entrepreneurship, marketing (market feasibility, research, customer relations/service, pricing), finances (recordkeeping, raising capital, growing/expanding financial issues), business plans for potential business owners, patents/trademarks/copyrights, insurance, zoning, and legal requirements, identification of business

opportunities, and youth entrepreneurship programs.

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

Extension	
Direct Methods	Indirect Methods
<ul style="list-style-type: none"> ● Workshop ● Group Discussion ● One-on-One Intervention ● Demonstrations ● Other 1 (Interactive Video Conferencing) 	<ul style="list-style-type: none"> ● Public Service Announcement ● Newsletters ● Web sites other than eXtension

3. Description of targeted audience

The target audience for this work would be other scientists, agricultural producers, general public, home owners, green industry officials, professional landscape managers, turfgrass sod producers, local and regional livestock (primarily beef, dairy and equine) producers, small acreage owners, veterinarians, USDA, other private businesses, and government entities that conduct work in this area.

V(G). Planned Program (Outputs)

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

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

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

V(H). State Defined Outputs

1. Output Measure

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

V(I). State Defined Outcome

O. No	Outcome Name
1	Number of clientele who gain knowledge about improved human, plant, and animal management systems.
2	Number of clientele who implement improved human, plant, and animal management systems.

Outcome # 1

1. Outcome Target

Number of clientele who gain knowledge about improved human, plant, and animal management systems.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 202 - Plant Genetic Resources
- 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants
- 205 - Plant Management Systems
- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 213 - Weeds Affecting Plants
- 215 - Biological Control of Pests Affecting Plants
- 216 - Integrated Pest Management Systems
- 301 - Reproductive Performance of Animals
- 302 - Nutrient Utilization in Animals
- 304 - Animal Genome
- 307 - Animal Management Systems
- 603 - Market Economics

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 2

1. Outcome Target

Number of clientele who implement improved human, plant, and animal management systems.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 202 - Plant Genetic Resources
- 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants
- 205 - Plant Management Systems
- 211 - Insects, Mites, and Other Arthropods Affecting Plants

- 213 - Weeds Affecting Plants
- 215 - Biological Control of Pests Affecting Plants
- 216 - Integrated Pest Management Systems
- 301 - Reproductive Performance of Animals
- 302 - Nutrient Utilization in Animals
- 304 - Animal Genome
- 307 - Animal Management Systems
- 603 - Market Economics

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

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

Description

There will be many factors influencing our ability to follow through on the goals that are set herein. Economic conditions are expected to remain subdued at best over the near term. Our budget is expected to remain stable at best as the state's economy continues to adapt to new world economic realities. We expect county-level budgets to remain the same over the short term. Economic conditions remain weak and a rapid recovery is not expected. Furthermore, when changes do come, it will likely impact new portions of the economy rather than the more traditional sectors such as extractive industries. Competing public priorities (primarily social programs, public health, and particularly prisons) will continue to have an impact on budgets to CES and UAES. The composition of the state's population continues to change, with a higher immigration and in-migration of Individuals outside traditional groups. No doubt, this will bring about evolving goals and program areas. Higher education is expected to change in ways that were previously thought not possible, with much more being done online in interactive settings. Government regulations and public policy changes will also continue and that will determine to a significant extent how many of our stated goals can be achieved. In short, external factors may have a more significant impact on our ability to deliver good science information than any time in the recent past.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

Numerous methods of evaluation will be used. In addition to the overall "before-after" evaluation, the program will be evaluated as we work through the program. Time series studies are particularly helpful when evaluating changes under this planned program and time series data will be collected to verify how effective this planned program is. Case studies will be utilized where appropriate (particularly with innovators), and comparisons will be made between the participants and those not participating where appropriate. There are some obvious limitations to this approach given that most of what we observe is not within a controlled environment, but is the result of some people adopting practices while others may not. The bench sciences are able to conduct studies with and without treatments, whereas the social sciences must look at adoptors versus nonadopters in a different light (self-selecting bias).

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Climate Change and Natural Resource Use

2. Brief summary about Planned Program

The Western U.S. contains many of the fastest growing states in the nation. These states often contain vast tracts of public land that comprise an average of 60% of the available land base, surrounding smaller areas that are privately owned, mostly adjacent to water. The natural resource base of any economy is critically important to the economic and aesthetic environments for that area. Changes to that natural system bring about changes in the underlying economic and social structure, some positive and some negative. Given the values associated with natural resources and the environment, it is critical that the elements of each be better understood. Although there are numerous aspects of natural resource systems, for purposes of this program, the environment is considered those characteristics found in soils, water, range, forest, animals, and air resources. The proper and efficient management of these resources has become a primary concern, particularly for environments as varied and unique as in the West. This planned program involves improving decision-making relative to environmental factors in an economic, social, and biological sense.

Soil and water conditions, in particular, greatly impact the earth's ability to produce plant materials, which in turn leads to issues related to animal feeding. Animal or livestock feeding is the major use made of arable land within Utah and many of the states that surround Utah. Hence, issues related to plants and animals are truly based in the nature and composition of soil and water. Furthermore, water is extremely scarce in the semi-arid west. Most of Utah receives less than 16" of moisture each year. Water must be saved from periods of snowfall, held in reservoirs, then distributed to arable land through a complex and comprehensive network of water distribution structures, i.e., ditches and canals. Some models predict that there will be less moisture in the form of snow and more in the form of rain. Wise water use is essential and is affected by the type of moisture received and soil across which the water must flow. Plant management systems are closely tied to water and soil and work is needed to better understand plant biological efficiency and abiotic stresses affecting plants. This, in turns, impacts plant management systems. Weeds are also impacted by the nature of the soil and availability of water in the system. All natural resource systems are tied together and chas in any single component (precipitation patterns) will have a major impact on other resources.

UAES faculty, extension specialists, and extension agents educate their respective target audiences. For experiment station faculty their audiences are geared primarily towards extension specialists and other scientists; the specialists' audiences include peers, county agents, federal and state organizations, producer groups, and the general public. County agents work cooperatively with federal, state, and local governments, citizen groups, and the public to address soils and water issues in their areas.

3. Program existence : Mature (More then five years)

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

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

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

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	6%		5%	
112	Watershed Protection and Management	8%		10%	
121	Management of Range Resources	9%		10%	
123	Management and Sustainability of Forest Resources	4%		10%	
132	Weather and Climate	0%		15%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		10%	
205	Plant Management Systems	42%		10%	
213	Weeds Affecting Plants	1%		10%	
307	Animal Management Systems	29%		10%	
605	Natural Resource and Environmental Economics	1%		10%	
	Total	100%		100%	

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

1. Situation and priorities

The use and nonuse of natural resource systems and the environment has a major potential impact on agriculture, urban growth and development, and area aesthetics. The opposite relationship also holds true. Wildlife of all forms have been an abundant natural resource but are being impacted by increasing population centers, homes being built on traditional wildlife ranges, increased human interactions and predation.

Approximately 79% of Utah is classified as rangeland and grazeable woodland or forest. Much of this important land area is administered by federal or state agencies. In the absence of fire in more mesic areas, there has been an aging of the sagebrush until much of it is now classed as decadent with little structural, age class, or associated species diversity. This creates significant impacts to the habitat for numerous species, especially the sage grouse, pigmy rabbit, sage sparrow and other sagebrush obligate species, many of which have been considered for placement on the endangered species list.

The forest lands have also gradually changed with reduced fire frequency resulting from decades of aggressive fire suppression and associated fuel build up, conifer invasion and aspen depletion. Conversion from deciduous aspen woodlands to coniferous forest results in reduced yields of water from these watersheds.

Invasive and noxious weeds have become an increasing menace to the productivity of range and forest lands. Invasive weeds disrupt the delicate ecological balance of Utah's native plant and wildlife communities, posing perhaps the single greatest threat to natural ecosystems in the West.

Historically, development in the West generally originated along flowing rivers and streams as the rest of the land was considered too dry for crop production. Utah's watersheds are the mountains and the winter snows provide an annual cycle to refill the groundwater and storage facilities. The major water user

in the western states is still irrigated agriculture. However, urban pressures have increased competing demands for water and open space. Given the limited water and good soil, it seems wise to consider the very nature of plant, soil, and water relationships in this semi-arid environment. Watershed maintenance and protection must become a high priority in water-short areas.

Air quality is becoming an issue of concern because of new regulations, but also because of problems which occur in some areas with temperature inversions. Agriculture is being blamed for contributing to this problem, as is climate change, and needs to be involved in the evaluation and resolution of this problem.

A final problem is soil erosion. Soil is a basic resource and much of plant and animal production is dependent on fertile soils being used for appropriate plant growth. It is essential that this basic resource is conserved.

These problems are expected to be exacerbated by changes in the mountain west's climate.

2. Scope of the Program

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

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

1. Assumptions made for the Program

1. The West contains many unique and varied environments.
2. Men and women and their interests, desires, and needs are an integral part of the region's environments.
3. Development is very case specific in terms of costs and benefits.
4. Knowledge can be increased with respect to the management and conservation of scarce resources.
5. Humans and the environments in which they live can coexist in order to sustain life over time.
6. Environmental goods do not have an infinite positive value; actions taken by humans do not have an infinite negative value.
7. Soil, water, forests, ranges, and wildlife are critical elements of the natural resources in Utah.
8. Many different interests and needs vie for use of these resources.
9. Ease of travel and increased use of public lands has increased the occurrence and spread of weeds and increased the frequency of large scale fires and a repeated fire cycles.
10. A lack of low intensity fires resulting from decades of aggressive fire suppression has enabled the conifers to greatly expand their range and crowd out the aspen groves.
11. These problems require the combined effort of agricultural and forest producers, agencies, specific interest groups and even the general public.
12. Improved management is essential to maintaining or increasing the value of rangelands, forests, wildlife habitat, watershed function, recreation, and other uses.
13. Vast amounts of public lands will remain in the West.
14. Pressures between alternative users of public lands will increase as populations increase.
15. Urban encroachment into rural, often agricultural, lands will continue as the population grows.
16. People will work together to find solutions to existing problems if a way is provided for them to

work together and they are allowed a say in the final solution.

17. There will be increasing pressure on water quantity and quality, both for agricultural, residential, and commercial uses.

18. Water will continue to be relatively scarce throughout critical production agriculture areas and general expanding urban areas and may become increasingly scarce with any climate changes.

19. Conservation can extend water and soil availabilities.

20. Economics drive much of the use of soil and water and it is this fundamental relationship that becomes so important for the West.

21. Education and science based information is essential for coordination.

22. Improved knowledge will lead to improved use and conservation.

23. Management of forest lands impacts the yield of the watersheds and must be part of the plans for future water resources.

24. Irrigation is essential for most agricultural production and urban development in Utah.

25. Funding will remain secure throughout the study interval.

26. Sufficient faculty and staff will remain available to work in this area to bring the project to a successful conclusion.

27. Community planning contributes to long-term quality of life and conserves important natural resource and environmental values.

2. Ultimate goal(s) of this Program

1. Better identify soil, plant, water, and nutrient relationships.
2. Improve range resource management
3. Enhance forest resource management
4. Strengthen air resource protection and management
5. Advance natural resource and environmental economics
6. Protect, maintain, and improve terrestrial wildlife and their habitat in Utah.
7. Develop conservation and efficient water-use systems for both urban and agricultural settings.
8. Protect and manage watersheds.
9. Enhance the quantity and quality of water available for use in Utah.
10. Improve soil management, conservation and quality.
11. Identify alternative means of coping with global climate change.

V(E). Planned Program (Inputs)

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

Year	Extension		Research	
	1862	1890	1862	1890
2017	12.0	0.0	19.1	0.0
2018	10.0	0.0	19.1	0.0
2019	12.0	0.0	19.1	0.0
2020	12.0	0.0	19.1	0.0
2021	12.0	0.0	19.1	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

1. Continue to facilitate and assist the establishment and success of local Conservation Resource Management (CRM) groups, for more local control of decisions on natural resources.
2. Educate the public with respect to the principle causes of air pollution and their role in prevention.
3. Partner with others to enable agriculture producers to meet EPA requirements.
4. Establish herbicide demonstration/research plots to evaluate the efficacy of these products under local conditions.
5. Conduct projects consultations, and workshops focusing on the role of outdoor recreation and natural resource-based tourism in relation to community development.
6. Partner with others in education and use of resources to rehabilitate the sagebrush steppe environment.
7. Educate and partner to enable the recovery of the sage grouse, pygmy rabbit and others to avoid listing as endangered species.
8. Determine management options that slow or stop the cycle of cheatgrass and fire on previously burned areas through range rehabilitation, seeding programs and nontraditional approaches to grazing management.
9. Educate producers and agency personnel on the need for continued range evaluation, monitoring, and management improvements and the role of grazing management in sustainable resource management.
10. Educate the public on responsible use and the value of multiple uses on rangelands.
11. Illustrate the need for management and control of pinion-juniper forests to restore watershed, wildlife habitat and forage values on rangelands.
12. Educate the public regarding various options with respect to adapting to global climate change
13. Provide information to landowners and users on grazing management of grazeable lands.
14. Partner with and educate the general public, livestock producers and agency personnel on the identification and methods of control of the specific noxious and invasive species.
15. Conduct experiments and develop theories that can be used to enhance water, soil, wildlife, and for various agronomic and urban areas.
16. Publish studies relating to this program area.
17. Provide educational training, problem solving, and in-depth applied information to: facilitate rehabilitation of degraded watersheds, protect and manage watersheds, conserving, managing and enhancing efficient water use, derive efficient irrigation strategies and technologies, implement water-wise landscaping practices, evaluate and promote plants that require less water and are drought tolerant, preserve and enhance water quality, enhance quality, capture, and use of storm-water and gray-water, identify areas of current or potential soil loss or reduced soil fertility and partner with other agencies to reduce and control these problems, educate producers on the important interactions of soil and irrigation, provide information on soil nutrient deficiencies and cost effective soil quality and fertility improvements, continue demonstration projects - salinity, soil types, non-traditional soil fertility amendments, fertilizer formulation efficacy, organic matter use and management.

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

Extension

Direct Methods	Indirect Methods
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<ul style="list-style-type: none">• Workshop• Group Discussion• One-on-One Intervention• Demonstrations• Other 1 (Interactive Video Conferencing)	<ul style="list-style-type: none">• Public Service Announcement• Newsletters• Web sites other than eXtension
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3. Description of targeted audience

The target audience includes the general public, users of various environments (agricultural producers, extractive industry representatives, environmentalists, green industry professionals, etc.), small acreage owners, private forest owners, extension agriculture and horticulture agents, federal and state water and soil management agencies, and other academics and resource managers.

V(G). Planned Program (Outputs)

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

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

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

V(H). State Defined Outputs

1. Output Measure

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

V(I). State Defined Outcome

O. No	Outcome Name
1	Number of clientele who gain knowledge about improved human, plant, and animal management systems that relate to climate change and/or natural resource use.
2	Number of clientele who implement improved human, plant, and animal management systems as related to climate change and/or natural resource use.

Outcome # 1

1. Outcome Target

Number of clientele who gain knowledge about improved human, plant, and animal management systems that relate to climate change and/or natural resource use.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 102 - Soil, Plant, Water, Nutrient Relationships
- 112 - Watershed Protection and Management
- 121 - Management of Range Resources
- 123 - Management and Sustainability of Forest Resources
- 132 - Weather and Climate
- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 205 - Plant Management Systems
- 213 - Weeds Affecting Plants
- 307 - Animal Management Systems
- 605 - Natural Resource and Environmental Economics

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 2

1. Outcome Target

Number of clientele who implement improved human, plant, and animal management systems as related to climate change and/or natural resource use.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 102 - Soil, Plant, Water, Nutrient Relationships
- 112 - Watershed Protection and Management
- 121 - Management of Range Resources
- 123 - Management and Sustainability of Forest Resources
- 132 - Weather and Climate
- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 205 - Plant Management Systems
- 213 - Weeds Affecting Plants

- 307 - Animal Management Systems
- 605 - Natural Resource and Environmental Economics

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

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

Description

There will be many factors influencing our ability to follow through on the goals that are set herein. We expect economic conditions to remain subdued at best over the near term. We expect stable budgets as the state's economy continues to adapt to new world economic realities. We expect county-level budgets to remain the same over the short term. Economic conditions remain weak and a rapid recovery is not expected. Furthermore, when changes do come, it will likely impact new portions of the economy rather than the more traditional sectors such as extractive industries. Drought conditions may shift from the southern part of the state to the northern counties. Competing public priorities (primarily social programs, public health, and particularly prisons) will continue to have an impact on budgets to CES and UAES. The composition of the state's population continues to change, with a higher immigration and in-migration of individuals outside traditional groups, particularly Hispanic and displaced international groups. No doubt, this will bring about evolving goals and program areas. Higher education is expected to change in ways that were previously thought not possible, with much more being done online in interactive settings. Government regulations and public policy changes will also continue and that will determine to a significant extent how many of our stated goals can be achieved. In short, external factors may have a more significant impact on our ability to deliver good science information than any time in the recent past.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

Numerous methods of evaluation will be used. In addition to the overall "before-after" evaluation, the program will be evaluated as we work through the program. Time series studies are particularly helpful when evaluating changes under this planned program and time series data will be collected to verify how effective this planned program is. Case studies will be utilized where appropriate (particularly with innovators), and comparisons will be made between the participants and those not participating

where appropriate. There are some obvious limitations to this approach given that most of what we observe is not within a controlled environment, but is the result of some people adopting practices while others may not. The bench sciences are able to conduct studies with and without treatments, whereas the social sciences must look at adoptors versus nonadopters in a different light (self-selecting bias).

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Sustainable Energy

2. Brief summary about Planned Program

The U.S. and rest of the world have relied on nonrenewable energy sources for over a century. There are some negative aspects of such a reliance including increased air, soil, and water pollution, ground water contamination, etc., even while the use of such energy resources has provided unprecedented growth and the highest standard living in the history of the world. In addition, there is now considerable interest in underground "fracking" as a way of freeing up additional oil and natural gas resources, the consequences of which are not fully known. Of course, the ability of individual country's to participate in that growth is often limited by its resource base. Thus, we also have unprecedented division between those countries that have benefited from the relatively cheap energy provided by carbon deposits, whether coal, natural gas, or petroleum, and those that have no access to such resources. There is a general consensus that the current pace of energy consumption can continue to rely on traditional energy sources for only so long, then it will be necessary to shift to an alternative source of energy. Besides the energy supply issue, many are concerned about the effects of current energy sources and uses on the earth's environments including ground, water, and air contamination.

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

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

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

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

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
206	Basic Plant Biology	0%		50%	
402	Engineering Systems and Equipment	55%		25%	
403	Waste Disposal, Recycling, and Reuse	45%		25%	
	Total	100%		100%	

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

1. Situation and priorities

Utah is home to some of the largest high quality coal deposits in the U.S. However, much of that high quality coal can presently only be accessed through underground mining, which is more expensive than surface mines found elsewhere. There is an energy source that is remarkably clean and Utah also has that in abundance--natural gas. Still, such deposits do little to encourage those who are concerned

about the environment or national energy independence. Hence, there is a need to invest in alternative fuel types, those that are often referred to as "clean" fuels, such as biofuels. Because of the nature of the crop base in Utah, there has not been much work done-to-date on alternative fuels. Until a process that utilizes crop residues (primarily straw) is proven cost effective, research in Utah will focus on basic biofuels research. Work is beginning in the conversion of algae into energy through biotechnology. Some work has also been initiated to determine the extent to which waste crop and food material can be made to meet some of the energy demand that has resulted in the State's participation in a Western Governor's initiative of becoming more energy independent. As noted above, there is considerable interest and work in natural gas and oil capture through a "fracking" process that has reduced reliance on foreign oil and gas. Of course, there are environmental concerns with this process.

2. Scope of the Program

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

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

1. Assumptions made for the Program

1. Biofuels are a set of emerging technologies that will provide the basis for additional agricultural revenue to those with large quantities of crop residues.
2. Interest will continue to grow in this area and biofuels will become a part of the energy complex of this country, as well as the world.
3. As long as alternative energy sources are less expensive, movement to biofuels will be slow.
4. It will take a large investment of public resources to provide the necessary science to support the biofuels industry.
5. Increased levels of investment funding will continue into the foreseeable future.
6. Budgetary resources will remain intact for the foreseeable future.
7. Sufficient faculty and staff will remain available to work in this area to bring the project to a successful conclusion.

2. Ultimate goal(s) of this Program

1. Identify which biofuels are best suited to Utah's climate and resource base.
2. Depending on the emergence of technologies suited for Utah's primary sources of biofuels, develop economically and socially viable alternative energy sources and production processes that can provide additional revenue to Utah's producers and processors.

V(E). Planned Program (Inputs)

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

Year	Extension		Research	
	1862	1890	1862	1890
2017	1.0	0.0	0.5	0.0

2018	1.0	0.0	0.5	0.0
2019	1.0	0.0	0.5	0.0
2020	1.0	0.0	0.5	0.0
2021	1.0	0.0	0.5	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

1. Conduct research into alternative biofuels and methods of production that are well-suited for the Intermountain West.
2. Publish in peer-reviewed journals and other professional outlets.
3. Take the research that is done and adapt that research so useful practical strategies might be followed in producer biofuels to the extent that it can be shown to be beneficial in terms of benefits and costs.

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

Extension

Direct Methods	Indirect Methods
<ul style="list-style-type: none"> ● Workshop ● Group Discussion ● One-on-One Intervention ● Demonstrations 	<ul style="list-style-type: none"> ● Public Service Announcement ● Billboards ● Newsletters ● Web sites other than eXtension ● Other 1 (USU Extension)

3. Description of targeted audience

For experiment station faculty their target audiences are primarily directed towards extension specialists, county agents, and other scientists; the extension specialists' audiences include peers, county agents, federal and state organizations, producer groups, state and local government, and the general public. County agents work cooperatively with federal, state, and local governments, citizen groups, and the public to address sustainable energy issues in their areas.

V(G). Planned Program (Outputs)

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

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

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

V(H). State Defined Outputs

1. Output Measure

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

V(I). State Defined Outcome

O. No	Outcome Name
1	Number of clientele gaining sustainable energy knowledge
2	Number of clientele who implement sustainable energy practices

Outcome # 1

1. Outcome Target

Number of clientele gaining sustainable energy knowledge

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 206 - Basic Plant Biology
- 402 - Engineering Systems and Equipment
- 403 - Waste Disposal, Recycling, and Reuse

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 2

1. Outcome Target

Number of clientele who implement sustainable energy practices

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 206 - Basic Plant Biology
- 402 - Engineering Systems and Equipment
- 403 - Waste Disposal, Recycling, and Reuse

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes

- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Description

There will be many factors influencing our ability to follow through on the goals that are set herein. We expect economic conditions to remain subdued at best over the near term. We expect further downward adjustments in budgets will have to be made as the state's economy continues to adapt to new world economic realities. We expect county-level budgets to remain the same over the short term, or even decline. Economic conditions remain quite weak and a rapid recovery is not expected. Furthermore, when changes do come, it will likely impact new portions of the economy rather than the more traditional sectors such as extractive industries. Drought conditions may shift from the southern part of the state to the northern counties. Competing public priorities (primarily social programs, public health, and prisons) will continue to have an impact on budgets to CES and UAES. The composition of the state's population continues to change, with a higher immigration and in-migration of Individuals outside traditional groups. No doubt, this will bring about evolving goals and program areas. Higher education is expected to change in ways that were previously thought not possible, with much more being done online in interactive settings. Government regulations and public policy changes will also continue and that will determine to a significant extent how many of our stated goals can be achieved. In short, external factors may have a more significant impact on our ability to deliver good science information than any time in the recent past.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

Numerous methods of evaluation will be used. In addition to the overall "before-after" evaluation, the program will be evaluated as we work through the program. Time series studies are particularly helpful when evaluating changes under this planned program and time series data will be collected to verify how effective this planned program is. Case studies will be utilized where appropriate (particularly with innovators), and comparisons will be made between the participants and those not participating where appropriate. There are some obvious limitations to this approach given that most of what we observe is not within a controlled environment, but is the result of some people adopting practices while others may not. The bench sciences are able to conduct studies with and without treatments, whereas the social sciences must look at adoptors versus nonadoptors in a different light (self-selecting bias).

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Childhood Obesity, Nutrition and Community

2. Brief summary about Planned Program

This planned program is designed to answer many of the questions surrounding nutrition and human health, plus other issues relating to individual, family, and community well-being. Nutrition is of primary concern to public officials and obesity tops the list of nutritional concerns. Obesity is an epidemic and touches almost every family in one form or another. The citizens that remain in rural areas often bear a disproportional share of rising health costs. To add to the problem, Utah is one of the fastest growing states in the nation. It also contains vast tracts of public land that comprise an average of 60% of the available land base, surrounding smaller areas that are privately owned, mostly adjacent to water. Urban areas are expanding rapidly and many rural communities remain in peril as populations shift to urban areas and local industries become less profitable. In addition, there are many resulting conflicts between public and private land and their uses.

Thirty-five percent of the effort in this area has to do with improvements in nutrition. The remaining 65% of the effort has to do with actual individual, family, and community actions and interactions. Eighty-nine percent of respondents believed that we should be involved in the development of programs and research which promote healthier food choices through research and education. Respondents felt that specific program strategies centered on health issues (93%) and nutrition (89%) were exceptionally and reasonably important. Ninety-one percent felt that programs and research which promote human development and well-being are important, while 94% indicating support for programs and research promoting sound financial management and finances. Focus groups of recent bankruptcies revealed that many Utahans have poor financial management practices, including over-consumption. The results of surveys and forum listening sessions showed that 89% of respondents felt USU should have strong community development programs. Further, results of the listening sessions showed that 92% of respondents believed that USU should be involved in the development of programs and research to improve coordination and cooperation regarding communities' land use decisions at all levels of government. Regional focus groups specifically mentioned loss of agricultural lands and of open space, and expressed concern with preservation of private development rights and the need to revitalize rural Utah by building communities.

The Nutrition, Obesity, and Community Program area responds to these and other land use and community matters through the research and expertise of experiment station faculty and extension specialists, agents, and assistants.

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

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

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

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

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
608	Community Resource Planning and Development	9%		20%	
702	Requirements and Function of Nutrients and Other Food Components	0%		20%	
703	Nutrition Education and Behavior	11%		20%	
724	Healthy Lifestyle	2%		0%	
801	Individual and Family Resource Management	13%		15%	
802	Human Development and Family Well-Being	6%		10%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	0%		10%	
806	Youth Development	59%		5%	
	Total	100%		100%	

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

1. Situation and priorities

There has been a crises of nutrition in the U.S. even though there have also been large food surpluses. There is a need to provide much better nutrition information on various types of food to enable consumers to make wise choices. As the relationships among diet, health, and disease prevention have become clearer, nutrition and the promotion of healthy eating behaviors and lifestyles have received increased attention. Many teenage mothers are found in the low income brackets and they can benefit from participating in various nutrition programs as well as those eligible for Food Stamp Assistance. There is an epidemic of obesity in America. More work is needed to allow all people in the U.S. the opportunity share in the abundance of food items. Poverty rates are particularly high for the state's minority populations and for single mothers and fathers with one or more minor children living with them. One of the priorities of this planned program area is to expand nutritional research, education, and enhance nutrition behavior.

Community is the focal point where people feel a sense of personal involvement and take pride in their actions. People join with their neighbors to plan for a secure and prosperous future at a time where Utah families face unprecedented challenges as our society adjusts to continuing technological advances, changing economic conditions, rising energy costs, evolving demographics, and fluctuating employment patterns. Many families must develop individual risk-bearing strategies.

Utah is in the top 5 of the U.S. states with bankruptcy and much more research and education need to be done in order to free the state's consumers from this trap. Because of Utah's typically larger family size, the amount of income available for basic family needs slips below the mean for the rest of the United States. Utah families already face high debt loads leading to bankruptcy, low savings, and the lack of liquid assets. Hence, another priority of this planned program is to enhance individual and family resource management.

Youth issues are paramount in a state with higher than average birth rates. As the number of youth grows, more research and education is needed in identifying factors that influence growth and maturation.

A significant priority of this planned program area is to discover added methods for encouraging positive youth development.

Utah rural communities lack the planning personnel and skills to adequately develop provisions for comprehensive planning and design. Many have expressed the need for specific help with planning and design projects.

The existing conflicts between private and public land owners and urban-rural pressures are likely to be exacerbated over the next 5 years as alternative uses of public and private lands increase and urban encroachment continues to extend into rural areas of the state and region, resulting in a decline of available open-space. The economic viability of many rural areas is also in jeopardy.

2. Scope of the Program

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

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

1. Assumptions made for the Program

1. Food nutritional content is an important area of concern to Americans.
2. Nutrition in foods can be manipulated to enhance the value of food to all those who eat.
3. People can be educated to improve their own nutrition.
4. Individuals and families can be educated to improve their resource management through appropriate research and education.
5. People will work together to find solutions to existing problems if a way is provided for them to work together and they are allowed a say in the final solution.
6. Extension personnel assist their communities when they serve in various community roles on boards, as facilitators, when participating in special projects, assisting in grant writing, etc.
7. That effective leadership in community governance leads to more effective decisions.
8. Skills in effective leadership can be trained.
9. That community institutions (social services, health care, education, transportation, etc.) are important contributors to the quality of life.
10. Human development and well-being is an important goal for public institutions.
11. Improvements in the way in which youth develop can be determined and, if shown to be effective, will be adopted by American individuals and families.
12. Adults and youth learn best through a hands-on learn-by-doing approach.
13. Teenage mothers will benefit from participation in EFNEP.
14. Increased awareness and understanding of the relationship between nutrition and chronic disease will help lower healthcare costs.
15. Nutrition Education Assistants can learn and deliver nutrition education and chronic disease information to adults and youth.
16. Consumers are interested in learning more about food and ways to enjoy them, especially if they could preserve their cultural and traditional cooking.
17. Community planning contributes to long-term quality of life and conserves important natural resource and environmental values.

- 18. Vast amounts of public lands will remain in the West.
- 19. Pressures between alternative users of public lands will increase as populations increase.
- 20. Urban encroachment into rural, often agricultural, lands will continue as the population grows.
- 21. Rural economies can remain economically viable given an active and insightful local population.
- 22. Funding will remain secure throughout the study interval.
- 23. Sufficient faculty and staff will remain available to work in this area to bring the project to a successful conclusion.
- 24. Communities (particularly the smaller ones) benefit from access to specialized planning and design assistance.
- 25. Federal and state land managers and agencies will continue to involve the public in open forum planning collaborations.
- 26. Analytical capacities (e.g., surveys, planning, GIS) are critical to effective local governance, and the communities in Utah vary considerably in their access to and use of those methods.

2. Ultimate goal(s) of this Program

- 1. Strengthen the relationship between food structure and composition and human health, particularly those relationships involving obesity.
- 2. Expand nutritional research and education to enhance human nutrition and nutrition-related behavior.
- 3. Enhance individual and family resource management.
- 4. Develop improved methods of raising youth to become good citizens.
- 5. Reduce the level of disharmony between multiple users of public lands.
- 6. Facilitate transition from rural to urban areas while retaining open-space.
- 7. Improve economic viability of rural communities.
- 8. Help community decision-makers manage growth and change to preserve and enhance desirable local attributes, while simultaneously avoiding the various unfortunate consequences of unmanaged growth.

V(E). Planned Program (Inputs)

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

Year	Extension		Research	
	1862	1890	1862	1890
2017	50.0	0.0	7.8	0.0
2018	50.0	0.0	7.8	0.0
2019	50.0	0.0	7.8	0.0
2020	50.0	0.0	7.8	0.0
2021	50.0	0.0	7.8	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

- 1. Conduct research with respect to human nutrition, family finances, bankruptcy, and community development.
- 2. Publish studies and make presentations related to individuals, family finances, and community

well-being.

3. Conduct workshops and meetings, deliver activities, develop new curricula, write newsletters and news releases and post Internet fact sheets.

4. Provide training in a variety of mediums-face-to-face, satellite, group discussions, demonstrations, conferences and workshops, via DVDs, CDs, fact sheets, newsletters, and other media.

5. Include the following materials or media sources in training sessions: Take Charge of Your Money, Power Pay and Power Saves, Utah Saves Education and Outreach, Individual Development Account, First Time Homebuyer Assistance, Financial Education for Bankruptcy Filers (USU is certified by the Department of Justice to offer debtor education classes), Living Well on Less, Money Sense for Your Children, and Earned Income Credit assistance.

6. Utilize different teaching methods of The Utah Food Stamp Nutrition Education including individual, group classes, DVD video series, and an on-line course. FSNE Nutrition Education Assistants will provide other nutrition education opportunities to FSNE participants

7. Use the "Give Your Body the Best" curriculum developed in 2005 by USU to teach individuals or groups of low income persons regarding chronic diseases; on food allergies, intolerance, and poisoning; and lessons on getting to know foods and enjoy them.

8. Increase the capacity among other extension personnel to participate in or lead community self-assessments (SWOT analyses, asset mapping, search conferencing, surveys, etc.) that lay the groundwork for subsequent project activities.

9. Conduct research experiments and/or develop theories that can be used to explain (a) causes for public land conflicts and potential solutions, (b) solutions to the urban expansion into rural areas and open space, and (c) conditions for continued rural community economic viability.

10. Publish studies and make presentations related to these areas of concern.

11. Conduct workshops and meetings to educate local, state, and regional stakeholders concerning these issues.

12. Deliver educational and informational services through various media.

13. Develop educational resources related to rural economic viability for community leaders and other stakeholders

14. Provide for local training in principles developed that are related to this area of study.

15. Conduct design activities (for a park, a Main Street revitalization, etc.) that will typically yield a design of variable specificity (some might be conceptual drawings, others might be more extensive).

16. Provide consultations regarding land use planning policies and their implications on growth.

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

Extension

Direct Methods	Indirect Methods
<ul style="list-style-type: none"> ● Workshop ● Group Discussion ● One-on-One Intervention ● Demonstrations ● Other 1 (Interactive Video Conferencing) 	<ul style="list-style-type: none"> ● Public Service Announcement ● Newsletters ● Web sites other than eXtension

3. Description of targeted audience

The target group is the general population of Utah (including youth), with a special emphasis on Native Americans, Latinos, African Americans, Asians/Pacific Islanders, and low income families with

children at or below poverty levels, food stamp program eligible individuals, and individuals facing bankruptcy. A subgroup of the audience targets is pregnant teens and teen mothers.

Elected officials, appointed officials, general population (including youth), and at-large community opinion leaders and influential people are targeted for community development.

V(G). Planned Program (Outputs)

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

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

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

V(H). State Defined Outputs

1. Output Measure

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

V(I). State Defined Outcome

O. No	Outcome Name
1	Number of clientele who gain knowledge about nutrition education and behavior.
2	Number of clientele who implement practices of nutrition education and behavior.
3	Number of clientele who gain knowledge about individual and family resource management.
4	Number of clientele who implement individual and family resource management.

Outcome # 1

1. Outcome Target

Number of clientele who gain knowledge about nutrition education and behavior.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 608 - Community Resource Planning and Development
- 702 - Requirements and Function of Nutrients and Other Food Components
- 703 - Nutrition Education and Behavior
- 724 - Healthy Lifestyle
- 801 - Individual and Family Resource Management
- 802 - Human Development and Family Well-Being
- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 2

1. Outcome Target

Number of clientele who implement practices of nutrition education and behavior.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 608 - Community Resource Planning and Development
- 702 - Requirements and Function of Nutrients and Other Food Components
- 703 - Nutrition Education and Behavior
- 724 - Healthy Lifestyle
- 801 - Individual and Family Resource Management
- 802 - Human Development and Family Well-Being
- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 3

1. Outcome Target

Number of clientele who gain knowledge about individual and family resource management.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 608 - Community Resource Planning and Development
- 702 - Requirements and Function of Nutrients and Other Food Components
- 703 - Nutrition Education and Behavior
- 724 - Healthy Lifestyle
- 801 - Individual and Family Resource Management
- 802 - Human Development and Family Well-Being
- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 4

1. Outcome Target

Number of clientele who implement individual and family resource management.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 608 - Community Resource Planning and Development
- 702 - Requirements and Function of Nutrients and Other Food Components
- 703 - Nutrition Education and Behavior
- 724 - Healthy Lifestyle

- 801 - Individual and Family Resource Management
- 802 - Human Development and Family Well-Being
- 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- 806 - Youth Development

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

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

Description

There will be many factors influencing our ability to follow through on the goals that are set herein. We expect economic conditions to remain subdued at best over the near term. We expect stable budgets as the state's economy continues to adapt to new world economic realities. We expect county-level budgets to remain the same over the short term, or even decline. Economic conditions remain weak and a rapid recovery is not expected. Furthermore, when changes do come, it will likely impact new portions of the economy rather than the more traditional sectors such as extractive industries. Drought conditions have shifted from the southern part of the state to the northern counties. Competing public priorities (primarily social programs, public health, and particularly prisons) will continue to have an impact on budgets to CES and UAES. The composition of the state's population continues to change, with a higher immigration and in-migration of Individuals outside traditional groups, more specifically, Hispanic and displaced international populations. No doubt, this will bring about evolving goals and program areas. Higher education is expected to change in ways that were previously thought not possible, with much more being done online in interactive settings. Government regulations and public policy changes will also continue and that will determine to a significant extent how many of our stated goals can be achieved. In short, external factors may have a more significant impact on our ability to deliver good science information than any time in the recent past.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

Numerous methods of evaluation will be used. In addition to the overall "before-after" evaluation, the program will be evaluated as we work through the program. Time series studies are particularly helpful when evaluating changes under this planned program and time series data will be collected to verify how effective this planned program is. Case studies will be utilized where appropriate (particularly with innovators), and comparisons will be made between the participants and those not participating where appropriate. There are some obvious limitations to this approach given that most of what we observe is not within a controlled environment, but is the result of some people adopting practices while others may not. The bench sciences are able to conduct studies with and without treatments, whereas the social sciences must look at adoptors versus nonadopters in a different light (self-selecting bias).

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Food Safety

2. Brief summary about Planned Program

The food production complex is extraordinarily large within the US. As a part of this complex, U.S. citizens enjoy the largest variety of food of any nation on earth at the lowest relative cost. Consumers are driven to search out and try new and improved food products. Two areas of this system that are of special interest to Utah are milk and meats, though other products are also researched and produce. This vast choice of foods brings with it an issue of food safety throughout the system-production, processing, and consumption. With the large variety of food products, food safety is an issue that must be dealt with by producers, processors, distribution systems, and the final consumer.

The results of a state survey and forum listening sessions showed that 89% of respondents believed that Utah State University should be involved in the development of programs and research which reduce the incidence of food borne illnesses and contaminants through science-based knowledge and education. Respondents felt that specific program strategies addressing food safety (91%), food quality (87%), preservation and storage in the home (87%), and commercial food handler's safety (81%) were reasonably important to a plan of work.

The Production and Safety of Food Products program area responds to these and other food safety matters through the research and expertise of USU Experiment Station faculty, Extension specialists and agents. All of these professionals educate their respective target audiences. For experiment station faculty members, their audiences are geared primarily towards extension specialists and other scientists; the specialists' audiences include peers, county agents, federal and state organizations, producer groups, and the general public. County agents work cooperatively with federal, state, and local governments, citizen groups, and the public to address food issues in their respective areas.

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

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

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

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

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
303	Genetic Improvement of Animals	2%		10%	
311	Animal Diseases	0%		10%	
501	New and Improved Food Processing Technologies	0%		10%	
502	New and Improved Food Products	0%		15%	
504	Home and Commercial Food Service	43%		0%	
701	Nutrient Composition of Food	0%		10%	
702	Requirements and Function of Nutrients and Other Food Components	0%		15%	
704	Nutrition and Hunger in the Population	0%		10%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	0%		10%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	55%		10%	
	Total	100%		100%	

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

1. Situation and priorities

A substantial portion of the U.S. Agricultural complex is involved in the production of food and nonfood products. New methods of food production offer the potential for an even more efficient food production system. This includes new food and nonfood products from agricultural output. There is considerable potential for producing foods that are more healthy and delicious, both in terms of existing, as well as new, products. Food borne illness is a major cause of death, claiming the lives of our most vulnerable populations: the elderly, young, pregnant women, people with impaired immune function and the chronically ill. It also causes needless lost time from productive roles in the workplace. Improper food handling and preparation of food in food service establishments and in the home contribute to food borne illnesses. U.S. citizens have the broadest selection of food products in history. With these new food products, as well as with traditional food items, food safety has become a more critical topic in light of recent food safety issues or events, i.e., E coli and other bacteria recently found in many foods. Hence, there is a need for better methods of controlling diseases and pests as related to food products. Priorities include the development of new, healthy food products and the development of food safety procedures that will ensure a safe food product when delivered to the consumers.

2. Scope of the Program

- In-State Extension
- In-State Research

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

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

1. Assumptions made for the Program

1. Food production and processing remains a critical link in the agricultural complex.
2. New products are desired by the public that are healthy, delicious, and require little preparation time.
3. Food safety is a critical issue as the potential source of foods becomes greater through new food producing technologies.
4. New and improved methods of handling and preparing food safely are available.
5. Funding will remain secure throughout the study interval.
6. Sufficient faculty and staff will remain available to work in this area to bring the planned program to a successful conclusion.
7. Laboratory and related space will remain sufficient to carry out this program area.
8. Foodborne illness, a preventable and under-reported disease, is a public health and economic challenge.
9. Greater adoption of science-based home canning techniques is still needed by consumers.
10. Pregnant women, young children, older adults, and those with weakened immune systems are at greater risk for foodborne illness.
11. Others are at-risk groups because of low literacy and high risk behaviors.
12. Food Safety Managers Training is a vital component to reduce the established risk factors in retail and foodservice foodborne illness.
13. Small food manufacturers often lack the specific knowledge to produce safe and wholesome food products.

2. Ultimate goal(s) of this Program

1. Expose fully the relationship between food structure and composition and human health, particularly those relationships involving obesity.
2. Reduce the cases of food borne illnesses in Utah.
3. Improve the methods of safe food production, processing, and preservation.

V(E). Planned Program (Inputs)

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

Year	Extension		Research	
	1862	1890	1862	1890
2017	2.0	0.0	3.5	0.0
2018	2.0	0.0	3.5	0.0
2019	2.5	0.0	3.5	0.0
2020	2.5	0.0	3.5	0.0

2021	3.0	0.0	3.5	0.0
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V(F). Planned Program (Activity)

1. Activity for the Program

1. Conduct experiments and develop theories that can be used to develop a safer food supply from production, through processing, and to the final consumer.
2. Conduct experiments and develop theories that can be used to develop new food products or improve existing food products.
3. Publish studies and make presentations related to these two areas of concern.
4. Extend research to Utah residents, family consumer scientist agents, small and medium sized food processors, restaurant food safety managers to provide educational training and in-depth information on: safe food handling practices, safe food preservation and storage practices, certification to food safety managers, safe food handling practices for processors, and 4-H nutrition and health safety curricula and programs.

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

Extension

Direct Methods	Indirect Methods
<ul style="list-style-type: none"> ● Workshop ● Group Discussion ● One-on-One Intervention ● Demonstrations 	<ul style="list-style-type: none"> ● Public Service Announcement ● Billboards ● Newsletters ● Web sites other than eXtension

3. Description of targeted audience

The target audience will include food processors, agricultural producers, general consumers (both within and without Utah), family consumer science agents, at risk groups and their families, and other scientists.

V(G). Planned Program (Outputs)

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

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

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

V(H). State Defined Outputs

1. Output Measure

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

V(I). State Defined Outcome

O. No	Outcome Name
1	Number of clientele who gain knowledge about home and commercial food service.
2	Number of clientele who implement home and commercial food service practices.

Outcome # 1

1. Outcome Target

Number of clientele who gain knowledge about home and commercial food service.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 303 - Genetic Improvement of Animals
- 311 - Animal Diseases
- 501 - New and Improved Food Processing Technologies
- 502 - New and Improved Food Products
- 504 - Home and Commercial Food Service
- 701 - Nutrient Composition of Food
- 702 - Requirements and Function of Nutrients and Other Food Components
- 704 - Nutrition and Hunger in the Population
- 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

Outcome # 2

1. Outcome Target

Number of clientele who implement home and commercial food service practices.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 303 - Genetic Improvement of Animals
- 311 - Animal Diseases
- 501 - New and Improved Food Processing Technologies
- 502 - New and Improved Food Products
- 504 - Home and Commercial Food Service
- 701 - Nutrient Composition of Food
- 702 - Requirements and Function of Nutrients and Other Food Components

- 704 - Nutrition and Hunger in the Population
- 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

4. Associated Institute Type(s)

- 1862 Extension
- 1862 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

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

Description

There will be many factors influencing our ability to follow through on the goals that are set herein. We expect economic conditions to remain subdued at best over the near term. We expect further adjustments will have to be made as the state's economy continues to adapt to new world economic realities. We expect county-level budgets to remain the same over the short term, or even decline. Economic conditions remain quite weak and a rapid recovery is not expected. Furthermore, when changes do come, it will likely impact new portions of the economy rather than the more traditional sectors such as extractive industries. Drought conditions may shift from the southern part of the state to the northern counties. Competing public priorities (primarily social programs, public health, and especially prisons) will continue to have an impact on budgets to CES and UAES. The composition of the state's population continues to change, with a higher immigration and in-migration of Individuals outside traditional groups. No doubt, this will bring about evolving goals and program areas. Higher education is expected to change in ways that were previously thought not possible, with much more being done online in interactive settings. Government regulations and public policy changes will also continue and that will determine to a significant extent how many of our stated goals can be achieved. In short, external factors may have a more significant impact on our ability to deliver good science information than any time in the recent past.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

Numerous methods of evaluation will be used. In addition to the overall "before-after" evaluation, the program will be evaluated as we work through the program. Time series studies are particularly

helpful when evaluating changes under this planned program and time series data will be collected to verify how effective this planned program is. Case studies will be utilized where appropriate (particularly with innovators), and comparisons will be made between the participants and those not participating where appropriate. There are some obvious limitations to this approach given that most of what we observe is not within a controlled environment, but is the result of some people adopting practices while others may not. The bench sciences are able to conduct studies with and without treatments, whereas the social sciences must look at adoptors versus nonadopters in a different light (self-selecting bias).