University of Nevada Reno Combined Research and Extension Plan of Work
2020-2024

Status: Final
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I. Plan Overview

1. Executive Summary

The College of Agriculture, Biotechnology and Natural Resources (herein referred to as "CABNR", or "the College), Nevada Agricultural Experiment Station (herein referred to as "Experiment Station") and University of Nevada Cooperative Extension (herein referred to as "Cooperative Extension") are founding branches of Nevada's Land-Grant University. All three branches have had a long and distinguished record of fulfilling the tripartite mission of teaching, research, and outreach education benefiting the health and economic vitality of Nevada's citizens.

In an effort to be relevant and accountable, CABNR, Experiment Station and Cooperative Extension have continuously and systematically reviewed and focused programs to address Nevada's highest priority needs. Experiment Station and Cooperative Extension fully subscribe to and support the University's goal to achieve recognition as a "fully engaged" institution and are committed to the principles of accessibility and program utility that have guided the Land Grant University System for more than 150 years.

Our plan of work encompasses the six major program areas: (1) sustainable dryland agriculture, (2) natural and environment resources, (3) horticulture and food systems, (4) health, nutrition and food safety, (5) community and economic development, (6) children, youth and families.

This joint plan of work effectively addresses the some of the highest priorities put forth by Nevada’s stakeholders. Full implementation of this plan will require adequate time and sufficient funding. In order to effectively address the complex issues facing citizens in Nevada, the US, and globally, CABNR/ Experiment Station/Cooperative Extension must continue to increase its interdisciplinary and multidisciplinary problem-solving approaches. These goals presume that all three units maintain and grow collaborative partnerships with diverse community organizations, university academic units, local leadership, under-served populations, and federal and state agencies.

Over the next five years, Experiment Station will focus on a number of critical issues shown to be of greatest concern by Nevada’s stakeholders. These include: rangeland restoration, control and prevention of invasive weeds and the wildfire that ensue; continued protection of Nevada's forest and woodlands; improving Nevada's rangeland beef industry through medical advancements and grazing management programs; developing new alternative crops for consumption and the biofuels industry; fostering rural economic development; and improving the health of Nevadans through nutritional intervention and weight management.

As the outreach unit of the land-grant university, it is especially important that Cooperative Extension and the Nevada System of Higher Education (the governing body of Nevada’s colleges and universities) seek and seize opportunities to integrate university research with extension programming. The University of Nevada, Reno, as Nevada's land grant institution, must recognize Cooperative Extension's value as a connection between all the state's communities and the university research base and support and reward efforts to meet community needs.

2. FTE Estimates

Year	1862 Extension	1862 Research
2020	17.0	8.0

2021	17.5	8.0
2022	17.5	8.5
2023	18.0	8.5
2024	18.0	9.0

II. Merit / Peer Review Process

Cooperative Extension merit review process
Cooperative Extension's merit review process comprises multiple steps. Annually tenure-track Extension faculty prepare a Role Statement detailing their teaching, research, and service activities for the coming calendar year. Extension faculty review their individual Role Statements with their Area Director and/or Department Chair who ensures the quality and relevance of planned programming efforts effectively address formally identified program goals. The area director (regionally based), Director and Dean of the college review and approve the plan.

Annually, extension faculty evaluate their peers' teaching, research and service activities to assess overall performance and program quality. Peers consider the results of formal needs assessments, programs developed in response, and the substance of documented outcomes and impacts in rating peer performance and providing narrative feedback. Area Directors also conduct an annual review of faculty performance and provide narrative feedback. Area Directors then meet individually with faculty to discuss the documented results of the peer review and Area Director's review. The director and dean also reviews and signs off on the evaluation documents.

Finally, some extension efforts are a part of the Multi-State Review Committee (MRC) process and are documented, reviewed and approved by the sponsoring regional association. These committees are responsible for the review, evaluation, and recommendation of western multi-state programs which may involve research, academic programs, extension, and/or international programs.

Experiment Station's merit review process
Scientific peer review drives the initial selection of research projects that comprise the Experiment Station research portfolio. The Director of the Experiment Station solicits applications from Experiment Station appointed scientists in a general call for proposals that identifies annual priority areas. Faculty submit proposals through an in-house, web-based content management system. Based upon research priority area, expert peer reviewers are assigned by Experiment Station administration to rate proposals based upon merit in the field of research, principle investigator's qualifications, projected outcomes, degree of multi-disciplinary activity, and budget feasibility. The Experiment Station administration concurrently sends proposals to its external advisory board panel representing stakeholder interests for evaluation and ranking based upon their constituents' inputs.

Tabulated results, comments, recommendations and proposals are then sent to the principle investigator's home department administration for internal review. Departmental recommendations are then send forward to Experiment Station administration. All findings are then compiled by Experiment Station administration and final decisions are made based on the rankings, comments and stakeholder input.

III. Stakeholder Input

1. Actions to Seek

Faculty target traditional and non-traditional stakeholders through email and postal mail invitations to participate in public meetings, focus groups, and individual interviews. Poster announcements are placed in public places frequented by traditional and non-traditional audiences.

Formal needs assessments serve as another means for contacting stakeholders. Faculty continually assess stakeholders' perceived program priorities in order to efficiently allocate resources and to identify and develop partnerships for program implementation and delivery.

Frequently, faculty develop partnerships with a variety of stakeholder groups as part of program planning, development, and implementation. These community and organizational partnerships provide an ongoing venue for receiving stakeholder input and feedback for the life of a program.

Two advisory boards have been established to counsel Experiment Station and Cooperative Extension in matters of research, resident instruction and outreach. The boards' qualifications cover a wide spectrum of interest, from local ranchers to federal agencies. Board members are asked to conduct focus groups based upon their home district to ascertain viewpoints and ideas on the needs and deficiencies of their local region.

2. Methods to Identify

Experiment Station currently has a broadly based advisory board committee that meet and provides input multiple times per year. In addition, Experiment Station has faculty members that schedule and coordinate meetings throughout the state with the purpose of obtaining direct input into the Experiment Station's research portfolio.

Experiment Station's partnership with Cooperative Extension provides assistance and access to stakeholders through joint efforts like the annual Cattlemen's Update - a program designed to bring the researcher to the rancher - and Beginning Famers and Rancher events held throughout the state. With Experiment Station administration abiding by an "open door policy", informal discussions with key stakeholders provides important input into our research programs and resident instruction. Comments are also received through the Experiment Station website.

Cooperative Extension's stakeholder input is routinely used to identify emerging issues, to direct and redirect programs and also in the hiring process. Stakeholders include local elected and appointed officials, community leaders, citizens, under-served groups and individuals, university leadership, university academic departments, and extension faculty and staff.

Stakeholder input is used to determine the necessary qualifications of those hired and/or to create new positions, as new funding becomes available. Stakeholders also participate in extension faculty searches. Additionally, stakeholder input is used to help establish program priorities and to acquire necessary funding.

Cooperative Extension's primary data-collection methods include postal mail and internet surveys, focus groups, and individual interviews. Use of local newspapers and radio, through public-service announcements, encourage stakeholders to participate in public meetings and listening sessions. Results of community needs assessments are published and made available to other university faculty and the broader public via the Cooperative Extension website.

Both Cooperative Extension and Experiment Station sponsored exhibitor booths at annual meetings held by numerous commodity groups and local/state agencies.

All faculty target traditional and non-traditional stakeholders. Poster announcements are placed in public places frequented by traditional and non-traditional audiences. Faculty continually assess stakeholders' perceived priorities in order to efficiently allocate resources and to identify and develop.

Frequently, all faculty develop partnerships with stakeholder groups as part of program planning, development, and implementation. These community and organizational partnerships provide an ongoing venue for receiving stakeholder input and feedback.

3. Methods to Collect

In development and strategic planning of Experiment Station research programs and priorities, input is collected primarily through meetings with stakeholder groups and individuals including concerned citizens, ranchers, agricultural organizations, natural resources professionals and managers, state and federal agency representatives, food industry representatives, and Cooperative Extension administrators, specialists and educators.

Experiment Station also holds several public events during the year to gather information from stakeholders. Whenever it is feasible, efforts are made to coordinate relevant activities with Cooperative Extension to avoid duplication. Research

project participants obtained direct and indirect stakeholder input through varied avenues. Projects with social science components frequently used questionnaires and surveys. Stakeholder input to some basic science and some applied projects occurred in the form of reviewer inputs to proposals, and from questions, comments and discussions at regional, national and international conferences. Stakeholder input for other projects are collected through comments and questions at workshops and topical meetings for end users.

Cooperative Extension meets frequently with stakeholders throughout the state. This includes formal presentations to county commissions, the Nevada Association of Counties and community groups. Cooperative Extension also includes participation as a member in state panels and commissions and executive boards, such as the Nevada Sagebrush Ecosystem Council, the Nevada Governor's Drought Forum, the Nevada Governor's Council on Food Security and the Food Bank of Northern Nevada. County-based extension educators and extension administrators meet formally and informally with county commissioners, and public service groups, such as Rotary Clubs. Extension educators also conduct formal needs assessments involving survey instruments.

4. How Considered
The Experiment Station collects information from stakeholders to adjust issue areas that are influencing Experiment Station's future direction. These stakeholder priorities also directly influenced applied research activity, while influencing which departments or areas of expertise get hiring priority. Successful strategic hires enable Experiment Station to meet existing needs and at the same time reposition for those on the horizon.

Stakeholders help Experiment Station see into the future to identify those emerging issues. For example, recently the decision to hire faculty focused on fire science, hydrology, plant breeding, and livestock reproduction. Input from Nevada's cattle and sheep industry reinforced these decision, and the industry was represented on the search committee.

Immediate decision, such as where to invest funding to direct current faculty and their research into emerging issues such as drought tolerant vegetables, alternative biofuel feedstock and sustainable water sources derived from annual snow pack are weighted by stakeholder.

University of Nevada Cooperative Extension used local, regional and state needs assessments to design, deliver and evaluate programs. Cooperative Extension used reports from public meetings and processes, participation on commissions and boards of directors, participation in state and regional conferences to:

- Allocate funds from all sources
- Identify emerging issues to be addressed with new or expanded programs
- Redirect programs
- Hire staff
- Develop action plans and set priorities

IV. Critical Issues

1 Sustainable Dryland Agriculture

Description:
The livestock, forage, and specialty crop industry in Nevada comprise an essential component of the economic stability in rural communities. Nearly 95% of all land in Nevada is devoted to farming and ranching activities (79% rangeland, 13% cropland). There are 6,128,153 land and farm acres in Nevada producing primarily cattle and/or hay including alfalfa, timothy, and other hay products. Cattle and calves rank number one in cash sales for Nevada.

Sustainable dryland agriculture is the application of plant and animal production practices in dry areas of the world where lack of moisture limits crop production. Dry areas of the world make up about 42% of the earth’s surface. Nevada, the driest state in the nation, is considered one of these regions. Additionally, Nevada’s livestock industry operates on a thin profit margin and faces many challenges relative to economically producing and marketing livestock for long-term ranch sustainability.

Growing a strong agriculture economy in the driest state requires research and Extension programs addressing topics such as pest management, efficient irrigation, sustainable range management, alternative crops for high-desert areas, agricultural entrepreneurship, business and financial management and risk management for producers.

For the Experiment Station, efforts will be made to identify crops and animal breeds best adapted to production in these hot and dry conditions as well as development of new crop varieties and animal breeds better suited to tolerate and thrive under these conditions. The Experiment Station will also study plant and animal production practices to increase yields under these conditions.

Extension will address these topics and others to develop strong educational programs around forages, livestock, new and/or alternative crops for our state's producers, soil health, water education and improving farmer/rancher profitability and efficiency.

Term: Long

Science Emphasis Areas
Agroclimate Science
Bioeconomy, Bioenergy, and Bioproducts
Sustainable Agricultural Production Systems

2 Natural and Environmental Resources

Description:
Issues that impact Nevada's natural and environmental resources, include drought, floods, watershed and riparian management, wildfires, invasive species, noxious weeds, and conservation wildlife and their associated habitats. In particular, management of the rangelands and forest/woodlands are critically important; rangeland health is under attack by competition between livestock production, wildlife, feral horses/burros, and special interests. Competing interests present challenges to maintaining a healthy balance particularly when limited resources are available – such as water. Protection and management of these resources is necessary to the economic and ecological well-being of the state.

The Experiment Station will conduct studies to develop management practices to protect these natural resources. They will develop ways to better detect fires in order to provide a more rapid response and minimize their spread. Researchers will conduct studies to evaluate surface and groundwater quantity and quality along with seasonal snowpack. Additional studies to access water usage, storage, and water reclamation will be supported. Research assessing population growth, movement patterns, habitat selection, and resource competition will improve game animals and endangered species.

Extension will provide educational programs related to living with drought, water sustainability, rangeland management, noxious weed control and management, fuels management, use of native plant materials in rangeland restoration, and preparing homeowners and communities for fire. Extension will provide facilitation among multiple stakeholders to help them develop policies that will sustain our natural and environmental resources for multiple uses. With more than 90% of Nevada's land publicly owned, this is one of our state's largest challenges.

Term: Long

Science Emphasis Areas
Environmental Systems
Sustainable Agricultural Production Systems

3 Horticulture and Food Systems

Description:
Nevada has food deserts in 40 of 687 census tracts with 154,623 Nevadans living in low-income food deserts. Homeowners want information on growing their own food. There is also a growing specialty crop industry in the state, as well as urban horticulture/agriculture and hoop-house and greenhouse growing. With an increased interest in locally grown food, science-based education for growing in Nevada's climate and soils is needed for successful backyard gardens and urban farms to grow produce locally and alleviate the impact of food deserts in Nevada. This will help improve food security and contribute to economic development.

Homeowners and green industry professionals also want information on taking care of lawns, yards, and landscapes. Topics of interest include plant diagnostics, , pest management, native plant landscaping, pruning and water conservation. Landscape water use is of particular importance as it accounts for greater than two-thirds of residential water use.

For the Experiment Station, funding will support studies to improve the growing, harvesting, packaging, transporting, and marketing of fruits and vegetables grown in Nevada. Studies will also look at the economics of food production and how this production affects the natural environment.

Extension will provide the latest research-based information for growers, producers, green industry professionals, and homeowners to contend with drought, pests, and water use issues. Extension will provide education and information to homeowners and others on growing food locally, along with home and commercial landscape horticulture. Furthermore, Extension will provide educational programs to help move specialty crops and urban agriculture/horticulture industries forward.

Term: Long

Science Emphasis Areas
Agroclimate Science
Bioeconomy, Bioenergy, and Bioproducts
Education and Multicultural Alliances
Environmental Systems
Food Safety

4 Health, Nutrition and Food Safety

Description:
Improving the health of all Nevadans and making a safe and nutritious source of food available are critical issues to be addressed. A priority of the state is reducing the risks and behaviors that contribute to chronic disease with an emphasis on decreasing obesity through increased physical activity and the promotion of healthy diets. Nearly 32% of the children entering the Nevada school system are obese (21%) or overweight (11%); 7% of high school students report no fruit or vegetable consumption in the past week; only 13% of adults meet the daily fruit intake recommendations and 11% vegetable intake; and over 75% of Nevadans 18 and above do not meet physical activity guidelines and the prevalence generally increases with age. Additionally, over 12% of households in Nevada are food insecure, where access to healthy food is limited or uncertain.

For the Experiment Station, food security is an important issue and projects that seek to improve food security for various communities or segments of the population will be supported. Projects evaluating and improving the nutritional value of food will be supported. Studies to evaluate the health benefits of various nutrients will be conducted. Research into issues pertaining to pre- and post-harvest food safety for cattle and sheep will be supported.

For Extension, programs will help address a wide variety of issues, including: obesity and other related conditions, lack of physical activity, unhealthy behaviors, lack of fruit and vegetable availability and intake, and food safety and security. Educational programs like SNAP-Ed that provide nutrition education and promote an active lifestyle will be provided. Additional programs will encourage Nevadans to test their homes for cancer-causing radon; educate women who have abused opioids on healthy body image and eating; food safety training; and hands-on gardening and nutrition programs for youth.

Term: Long

Science Emphasis Areas
Education and Multicultural Alliances
Family & Consumer Sciences
Food Safety
Human Nutrition

5 Community and Economic Development

Description:
Nevada is the seventh largest state in the country in terms of land mass and one of the least densely populated states. It has the vast majority of its population concentrated in two counties (Clark and Washoe - Las Vegas and Reno, respectively) with relatively small communities scattered throughout the rest of the state. To complicate matters, Public Lands encompass nearly 87 percent of Nevada's land mass. These lands are managed by the Federal Government (Bureau of Land Management, Forest Service and Department of Defense) and land decisions can have a significant impact on economic development opportunities for communities of all sizes.

The culture and economics of rural Nevada are vastly different from that of the two metropolitan areas. Clark County alone represents over 73 percent of the state's total population and approximately 70 percent of total business licensees. As such, improving the economic and community development of rural areas as well as business development in urban areas are strategic priority in Nevada.

For the Experiment Station, funding will be provided to projects that evaluate and assist in the community and economic development of rural areas. Support will also be provided for projects that support agricultural economic development in both rural and metropolitan areas.

For Extension, programs will provide career development, research, education, facilitation, and services for business and industry startups, as well as existing businesses. Extension will partner with other organizations and lead efforts to model impacts of things such as public land policy changes, regional medical facilities, and other endeavors, including mines and processing plants. Extension will also collect and analyze demographic, social, economic, fiscal, and environmental data for Nevada counties and present the information in easy-to-read formats to stakeholders and decision-makers.

Term: Long

Science Emphasis Areas
Bioeconomy, Bioenergy, and Bioproducts
Education and Multicultural Alliances
Environmental Systems
Family & Consumer Sciences
Sustainable Agricultural Production Systems

6 Children, Youth and Families

Description:
Nevada ranks 46th among the 50 states for children's well-being. Issues affecting children, youth, and families include early literacy, science and math proficiency, college readiness, healthy child and adolescent development, and domestic violence.

Literacy is the fundamental skill upon which school and future work success are based. Less than one-third of Nevada's school age children are reading at or above proficiency, placing Nevada's children at extremely high risk for developing literacy-related problems, such as grade retention, school failure and dropout, delinquency, and unemployment or underemployment. Approximately, only one-third are proficient in science and less than one-quarter in math. Early exposure to STEM supports children's overall academic growth, develops early critical

thinking and reasoning skills, and enhances later interest in STEM study and careers. Additionally, children need safe environments for optimal social, emotional, physical and cognitive development – inclusive of the family, child care facility, and school setting. Nevada's increasing rates of child abuse and neglect and high rate of domestic violence and fatalities are of key concern for healthy child and adolescent development.

Extension programs will focus on parenting education, education for childcare providers, early literacy development, STEM enrichment, college and career readiness, 4-H youth development, and family violence prevention programming. In partnership with the fifth largest school district in the country (Clark County – Las Vegas), Extension's 4-H youth program will also focus on urban youth development through school-based interventions targeting improved college and career readiness.

Term: Long

Science Emphasis Areas
Education and Multicultural Alliances
Family & Consumer Sciences
Youth Development