WESTERN SARE Sustainable Agriculture Research & Education

From the Field:

SUSTAINABLE LIVESTOCK GRAZING MANAGEMENT

Highlights from Western SARE's Project Portfolio

LIVESTOCK AND LAND MANAGEMENT

Rangelands - natural landscapes consisting of grasslands, shrub lands, woodlands, wetlands, or deserts – make up approximately 42% of all U.S. lands. In the West alone, millions of head of livestock and wildlife utilize public and private rangelands. Both culturally and economically, rangeland grazing plays a significant role in western agriculture.

Western ranchers and land managers are confronting increasing populations of invasive species, resulting in high economic and environmental costs. They are also facing calls for improved grazing management due to concerns about overgrazing of plant species and introduced plant materials, soil erosion, water quality issues, impact on endangered and threatened species, and damaged riparian habitat. Rising feed costs and costs of managing the land are also affecting the future sustainability of western ranching. The ranching community needs reliable research-based information on sustainable livestock grazing practices and the true impacts of grazing on the land.

Western SARE has played a key role in addressing the research needs of livestock producers. In 26 years, Western SARE has funded over 90 projects related to livestock management in the western states. A significant portion of this portfolio addresses sustainable grazing management on rangelands and in riparian areas. The four projects highlighted in this publication represent high quality research conducted in collaboration with producers and the effective outreach that gets research results into the hands of producers, ag professionals, and land managers.

PROJECT HIGHLIGHTS

1 Developing a Handbook for Utilizing Livestock as a Tool in Noxious Weed Control in Nine Western States

EW04-004

Jay Davison, University of Nevada Cooperative Extension

The Challenge

The Bureau of Land Management defines a noxious weed as: "A plant that interferes with management objectives for a given area of land at a given point in time." Three hundred noxious species can be found on U.S. rangelands. Examples in the West include, but are not limited to, cheat grass, spotted knapweed, leafy spurge, and yellow star thistle. The high costs of noxious weed invasion, both environmental and economic, have been well documented. Noxious weed invasion has led to increased soil erosion and reduced carrying capacity for livestock and wildlife, among other impacts. Effective control of noxious weeds regularly ranks as one of the highest agricultural concerns in the West. Control methods commonly used, such as herbicides and controlled burning, have become more restricted; leaving ranchers and land managers to seek alternatives.

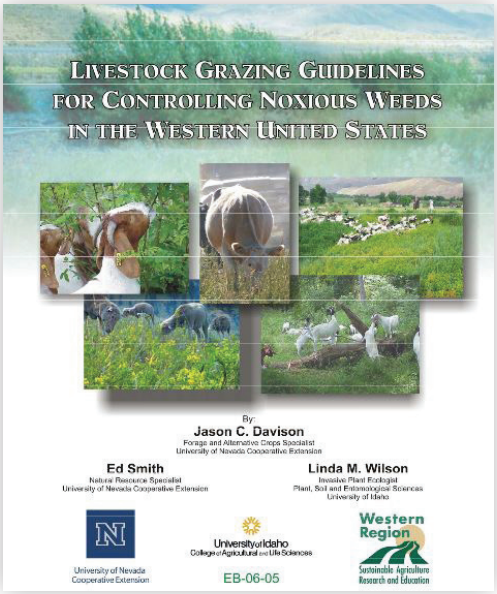
Researchers, ranchers, and land managers have recognized that livestock grazing can be a valuable and selective noxious weed management tool. In 2004, Jay Davison, University of Nevada Cooperative Extension, found that known techniques had not been summarized into a useful format. This weakness had led to slow adoption of livestock grazing as a management tool. Davison and colleagues designed a Western SARE Professional Development Program project ***Developing a Handbook for Utilizing Livestock as a Tool in Noxious Weed Control in Nine Western States*** (EW04-004) to summarize information concerning the use of livestock grazing to control important noxious weeds in nine western states, package the information in a readily useable format, and to disseminate the information to targeted audiences.

Searching for a Solution

Davison and his team set goals to:

- Develop a list of noxious weed species for California, Colorado, Idaho, Montana, Nevada, Oregon, Washington, Wyoming, and Utah.
- Collect, review, and summarize current knowledge about livestock grazing as a control method for each noxious weed species.
- Present this information in a handbook and distribute to Cooperative Extension, NRCS, and others.
- Evaluate program impact.

To meet the objectives, Davison and his team conducted an in-depth literature review, interviews with researchers, and a survey of grazing management practitioners. The knowledge gained from these efforts was to be used to develop a handbook, website and journal article, and as part of presentations in all nine states. The project was to ensure that Cooperative Extension, NRCS, and other personnel were more knowledgeable; livestock grazing as a noxious weed control tool would become more effective and widespread; and there would be a focal point for communication, information, and collaboration.



What Was Accomplished

Based on the information gathered, Davison and his team published and distributed *Livestock Grazing Guidelines for Controlling Noxious Weeds in the Western United States* as a handbook and a CD, as well as posting online. The creation and distribution of the handbook led to increased levels of awareness and knowledge of livestock grazing as a weed management tool. Evaluations show that recipients of the handbook are using it on a regular basis with 95 percent of users reporting it as somewhat to very useful, and 92 percent of the users reporting increased knowledge and awareness of the subject. The information in the handbook was shared with others by 61 percent of the users, while 20 percent cited it, 12 percent used it to design a grazing system for noxious weeds, and eight percent used it to teach a workshop.

Impacts

- The handbook was distributed beyond the targeted audience, with approximately 36 percent of the recipients of the handbook working outside of Cooperative Extension or NRCS.
- The handbook was highlighted before approximately 240 Bureau of Land Management employees during the Integrated Pest Management classes taught six times by the authors. This partnership between BLM and the authors had not occurred before, according to Davison.
- About 30 percent of handbook users reported implementing grazing prescriptions described in the publication.
- Nearly 80 percent indicated that their willingness to prescribe livestock grazing for noxious weed control had increased as a result of using the handbook.

Post-project Activities and Impacts

The handbook is still posted on the University of Nevada Cooperative Extension's website (listed below), Google Books, and other websites listing grazing management resources. Davison says that he receives requests for a printed copy of the handbook yearly, even 10 years after publication. He also states that more ranchers and land managers are implementing the practices highlighted in the handbook than when he first began the project.

Where to Learn More

Annual and Final Reports in SARE Database:

mysare.sare.org/mySARE/ProjectReport.aspx?do=viewProj&pn=EW04-004

Handbook:

unce.unr.edu/publications/files/ag/2006/eb0605.pdf

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PROJECT HIGHLIGHTS

2 BEHAVE Facilitators' Network

EW04-016

Kathy Voth, Livestock for Landscapes

The Challenge

Both pasture- and range-based livestock operations face challenges such as invasive species. The use of herbicides can increase costs to ranchers. In addition, concerns over potential undesirable environmental effects of herbicides also encourage ranchers, land managers, weed specialists, and range scientists to look for ecologically and economically viable ways to manage the land. Another challenge facing ranchers and land managers is pressure to improve management of domestic grazing in riparian areas. Ranchers' income can be decreased by the cost of fencing livestock out of riparian areas and reducing numbers or removing livestock from the area.

Kathy Voth, a livestock consultant, believed that an effective new approach may lie in the animals themselves. Previous research, along with successful implementation by ranchers, demonstrated the potential for livestock behavior to be modified and managed to improve and restore pastures and rangelands. She and the project team based in Utah designed a Western SARE Professional Development project, ***BEHAVE Facilitators' Network*** (EW04-016), to address the need for more education about using livestock's natural behavior to manage weeds and other vegetation. According to Voth, the project was developed to "continuously expand the network of trained, agriculture professionals to facilitate understanding and application of behavioral principles to increase environmental integrity, quality of life for people and animals, and economic viability of agricultural enterprises."

Searching for a Solution

Voth and her team aimed to develop a network of individuals:

- Trained in behavioral principles.
- Ready and able to teach others.
- Capable of helping producers implement behavioral solutions to problems.

At the time of the project's implementation, extension personnel in 10 Western states had agreed to be part of this training and to serve as their state's coordinator. Several ranchers also agreed to work with the training network by providing sites where behavioral techniques have been employed to solve management issues.

The goal was that each State Coordinator would train at least 10 facilitators in their home states who would then train others. In addition, the network would work with producers and agency staff by sharing information, materials, and practical strategies to successfully implement new livestock management methods.

Handbooks, videos, CDs, and a website were to be developed and the team was to ensure the use of training strategies suitable for adult learners, including workshops and problem-solving field tours.

What Was Accomplished

Voth and her team trained 10 state coordinators and 135 facilitators in behavioral principles. Workshops were held in Arizona, California, Colorado, Idaho, Montana, Nevada, Oregon, Utah, Washington, and Wyoming.

Prior to the formation of the BEHAVE Facilitator's Network, many of the workshop participants had not been aware of animal behavior research being conducted at Utah State University and other universities. After their attendance, participants reported a greater understanding of the information provided. According to surveys conducted at the end of many workshops, workshop participants rated their understanding of the information presented as 2.56 on a scale of 3 with 3 meaning "I understand completely" and 2 meaning "I can review the guide to understand." Many reported feeling confident to put on their own workshops about behavior. In addition, they left with support materials to learn more and were provided materials to distribute at their own workshops.

The BEHAVE Facilitator Handbook was created in 2006. The notebook includes: 1) a description of the BEHAVE Facilitators' Network, 2) tips and hints for successful presentations and workshops, 3) information about learning styles and adoption of new information, 4) copies of PowerPoint slides, 5) many fact sheets, 6) examples of applying behavior principles in livestock and wildlife management, and 7) step-by step instructions for training animals for demonstrations. It also includes 3 CDs and 4 DVDs. CDs include: 1) 9 annotated slide shows that overview the principles of behavior, 2) an online course about behavior, 3) a video CD designed for producers entitled "Using livestock behavior on your operation." DVDs include: 1) "Foraging behavior," 2) "Turning cows into weed managers," 3) video clips of animals demonstrating behavior principles, and 4) interviews with producers. The materials also include the book "Foraging Behavior: Managing to Survive in a World of Change." A website was also created.

Impacts

- Forty additional handbooks were distributed to educators.
- Nevada and Utah educators in corporated a presentation about behavioral principles into the Nevada Rangeland Management Schools for Ranchers. Presentations have also been given in other states.
- A survey reports that about 20% of respondents said that the workshop fundamentally changed the way they viewed managing animals, 40% said it clarified observation made in the field, and the remaining 40% said they were familiar with the BEHAVE project but that the workshop gave them additional information and materials.

Post-project Activities and Impacts

As Voth continues her extensive work providing presentations and trainings, writing a book "Cows Eat Weeds," maintaining a website, and starting with a friend a community-supported newsletter "On Pasture," she has seen increasing interest in animal behavior and grazing in the past 10 years. She maintains that audiences at workshops have changed from an attitude of skepticism to one of "this could work." "On Pasture", begun in March 2013, currently has 24,000 readers per month and her book is in its second printing. The BEHAVE Facilitators Network continues after 10 years, under the direction of Beth Burritt at Utah State University, with most of the original members involved.

Where to Learn More

Annual and Final Reports in SARE Database:

mysare.sare.org/mySARE/ProjectReport.aspx?do=viewProj&pn=EW04-016

Facilitators' Network website:

extension.usu.edu/behave/htm/behave-facilitators-network

includes handbook and other resources

Kathy Voth's website:

livestockforlandscapes.com

includes blog and links for signing up for newsletter and social media feeds

On Pasture's Newsletter:

onpasture.com

Utah State University's BEHAVE website:

extension.usu.edu/behave/

includes newsletter and other publications

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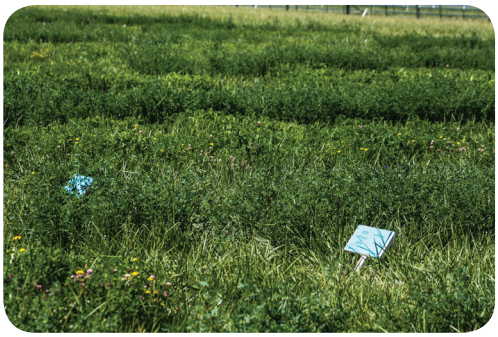

PROJECT HIGHLIGHTS

3 Improving Intake on Big Sagebrush by Cattle in Fall and Winter to Reduce Feed Costs and Improve Biodiversity and Productivity in the Sagebrush Steppe

FW10-048
Agee Smith, owner Cottonwood Ranch

The Challenge

Intact sagebrush steppe, an important ecosystem in the West, is rapidly disappearing because of non-native invasive plants, wildfires, drought, and encroachment of pinyon-juniper. Rejuvenating sagebrush steppe can benefit wildlife and livestock, but most methods are expensive and require use of fossil fuels. One possible method is grazing by cattle in the fall and winter when grasses and forbs are dormant, a method researched by rangeland specialist Chuck Peterson that was shown to have promise. Sagebrush, despite its terpene content, is a good source of energy and protein, especially in winter when terpenes are at their lowest levels. In 2010, Cottonwood Ranch owner Agee Smith followed up on Peterson's research and designed a Western SARE Farmer/Rancher project ***Improving Intake on Big Sagebrush by Cattle in Fall and Winter to Reduce Feed Costs and Improve Biodiversity and Productivity in the Sagebrush Steppe*** (FW10-048) to address two problems that many ranchers face in the Great Basin: 1) degradation of sagebrush steppe plant communities, and 2) increasing feed costs for livestock during fall and winter. Many ranchers see sagebrush as unpalatable to livestock. Challenges

Photo: Chuck Jensen

The Challenge (continued)

faced in training cattle to eat sagebrush include their aversion to sagebrush, neophobia (fear of trying new things), the taste, and coercion. Smith says, "You need tenacity to convince the animals to eat the sagebrush, but we have found success."

Searching for a Solution

Smith and his project team intended to improve ranch economics by increasing the number of cattle that can efficiently use sagebrush as winter forage and reducing costs. Their objectives were to:

- Explore management strategies that will improve ranch economics.
- Enhance/restore vegetative biodiversity in order to meet wildlife and domestic animal habitat and nutritional needs.
- Implement grazing management strategies that ensure proper application of timing, intensity and duration.
- Create livestock herds that possess locally-adapted nutritional wisdom and effectively utilize sagebrush.
- Successfully establish a cattle-based, biological brush management treatment method.
- Provide documentation and out reach efforts to enable other producers to use sagebrush as a winter forage source for their live stock.

One hundred and forty-one head of cows, with approximately thirty-five head (25%) having prior experience grazing sagebrush, were used. During the adaptation and replication phases, cattle were supplemented with grass hay and a protein-energy pellet to minimize the effects of the terpenes in big sagebrush. The cattle were provided a feed supplementation that included beet pulp, ground corn, soybean meal and alfalfa, grass hay and salt. They then were fed straight grain for three months prior to slaughter to rid their systems of terpene and ensure quality taste. Smith claims the goal was not to have sagebrush provide 100% of the cattle's diet, but to demonstrate that it can provide 20-30% of it, augmenting their protein needs with a readily available plant.

What Was Accomplished

Smith states that the cattle performed as expected by using sagebrush and rabbit brush as forage, thereby promoting a diversified and improved plant community that benefits both livestock and wildlife alike. There was about a 50% reduction in hay needed to feed the cows, which was an economic benefit to the ranch. The research demonstrated that fall and winter are ideal times for grazing big sagebrush because terpene levels in sagebrush are typically low and perennial herbs and grasses are largely senescent. Smith sees much interest in this research, stating, "If we can make this work, it could be quite a tool to enhance sagebrush steppe habitat and help ranchers with their winter feed."

Impacts

- Overall, cows maintained their weight and body conditions very well. Body scores did not go down even with 50% of nutrients coming from a native plant.
- Twenty-five ranchers, concerned citizens, and personnel from the Fish and Wildlife Service, Forest Service, and Utah Department of Agriculture and Food attended field day with presentations and a tour.

Post-project Activities and Impacts

Smith continues to work in his region on sustainable grazing and land management. In 2014 he gave a presentation to Utah State University's "Restoring the West" highlighting the changes to his land due to restoration efforts. The changes are significant. A roundtable of about 30 people still meet three times per year, which Smith claims is "absolutely critical to what we're doing." He is excited about the innovative solutions that have been discovered and believes that they will never go back to the old way of doing things.

Photo: Chuck Jensen

Where to Learn More

Annual and Final Reports in SARE Database:

mysare.sare.org/MySare/ProjectReport.aspx?do=viewProj&pn=FW10-048

YouTube Video, Agee Smith's Presentation at 2014 "Restoring the West" Conference:

youtube.com/watch?v=ZuMIZAm9PmQ&index=17&list=PLUF3cFT5aBZiZv1K_rToRGh1Z7tWvHFOv

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PROJECT HIGHLIGHTS

4 Confirmation of Riparian Friendly Grazing Project Results and Development of Achievable, Site Specific Reference Conditions for Grazed Riparian Areas

SW03-037

Kenneth Tate, University of California

The Challenge

Grazing livestock seek out water, vegetation, and shade that are available in riparian areas. Their tendency to congregate around water has been associated with damage to vegetation, stability of stream channels, and soil and water quality. Environmental organizations and other interested parties have claimed that traditional livestock grazing in riparian areas on western rangelands is unsustainable. However, others point out the lack of tested solutions and assert that there is a need for additional studies and a real workable definition of sustainable riparian grazing. Kenneth Tate, Rangeland Watershed Specialist for the University of California, as well as California Extension Advisors, ranchers, and land managers argued that riparian areas can be successfully grazed through "a partnership that employs producer knowledge of feasible grazing management combined with scientists' knowledge of riparian health."

Building on a previously funded Western SARE project, Tate and his team led the 2003 Research and Education project ***Confirmation of Riparian Friendly Grazing Project Results and Development of Achievable, Site Specific Reference Conditions for Grazed Riparian Areas*** (SW03-037) to develop grazing recommendations based on the previous research and share those recommendations with ranchers, public land managers, and others involved with California's natural resources.

Photo: Ken Tate, UC Davis

Searching for a Solution

Tate states that the "results from the previous project provided strong statistical evidence that common grazing management practices such as herding and attracting livestock away from riparian areas are positively associated with improved riparian and stream health. The key result was that the amount of effort or implementation of a practice (e.g., number of days each grazing season spent herding livestock away from the stream) was consistently positively associated with improved riparian health." This project was developed to confirm these results, selecting

Searching for a Solution (continued)

aquatic insects as the measurement of riparian health, and to determine realistic, site specific expectations for rangeland riparian health. The project team asserts that creating sustainable riparian grazing management is impossible without a clear and attainable target.

In the team's opinion, defining sustainable riparian grazing was dependent upon: 1) working directly with grazing managers to identify grazing practices which maintain riparian health, yet are logistically and economically feasible; and 2) conducting research at the ranch and grazing allotment scale to ensure the results are relevant at the management scale. Their goal was to identify grazing management to enhance riparian health on meadow streams. The objectives were to:

- Confirm the potential for site-specific grazing management practices to enhance important riparian health metrics, clearly documenting the potential for sustainable riparian grazing.
- Develop a protocol to establish achievable, site-specific expectations for riparian health, which provides grazing managers with riparian health targets.
- Extend the riparian grazing management recommendations developed from this work to private and public land grazing managers, as well as to regulatory and natural resources agencies.

Thirty-five ranchers and numerous agencies participated in the project to survey grazing management and aquatic insects across California grazed and non-grazed meadow streams. The study represents about 1 million acres of mountain grazing land and approximately 11,000 head of range beef cattle.

What Was Accomplished

The team declares that "the primary recommendation from this project is that enhanced riparian health in grazed systems can be achieved by traditional livestock management practices, particularly livestock distribution efforts." Results from the project clearly show that common grazing management tools can be put into practice that will improve and maintain riparian health. As Tate writes, these results provide a unique verification that negative impacts can be overcome with technically simple, low infrastructure dependent techniques." Most important is that the rancher or land manager exerts "consistent, adequate effort to control the timing and intensity of livestock use on meadow associated stream reaches." The significance of the cooperation between managers and applied scientists to conduct research at the management scale was also demonstrated via this project.

Impacts

- The team was able to develop similar projects examining relationships between livestock grazing and the endangered Yosemite Toad.
- A rancher can easily translate the recommendations into direct and indirect costs.
- Producer involvement and support was "stellar," providing credibility to the project in the industry.
- The project allowed for valuable and informal two-way education opportunities and interaction between producers, UCCE, USFS, BLM, NRCS, and other staff.
- Project results have a direct application to the 40 million acres of California rangeland.
- Results have been presented at California Cattlemen's Association and California Farm Bureau Federation annual conferences, to formal continuing education conferences of the U.S. Forest Service, the U.S. Natural Resources Conservation Service, the Society for Range Management, and other such organizations.
- Results have been incorporated into the UCCE-NRCS Ranch Water Quality Planning Short Course. This course has led to the development of over 400 ranch water quality plans covering over 1.2 million acres of private rangelands in California.

Post-project Activities and Impacts

Tate continues his work with the Rangeland Watershed Laboratory at UC Davis. Through this body, Tate is involved with Water Quality on U.S. Forest Service Grazing Allotments, a program that will evaluate water quality conditions, sources of water pollution, and guide management to improve water quality where needed in order to address concerns regarding nutrient and fecal indicator bacteria concentrations in U.S. Forest Service grazing allotments in the Sierra Nevada. He has had a subsequent Western SARE-funded project, Prescribed Grazing to Sustain Livestock Production, Soil Quality, and Diversity in Rangeland Ecosystems(SW10-073), when over 900 ranchers in California and Wyoming were interviewed to capture knowledge and perspectives on conservation goals, use of conservation programs, key ranch management practices, grazing management strategies, and managing for and during drought. One outcome of this project was a well-attended workshop and webcasts on ranching and California's drought.

Where to Learn More

Annual and Final Reports in SARE Database:

mysare.sare.org/mySARE/ProjectReport.aspx?do=viewProj&pn=SW03-037

Rangeland Watershed Laboratory:

rangelandwatersheds.ucdavis.edu/main/projects.htm

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ABOUT WESTERN SARE

SARE is a USDA competitive grants program that supports agricultural systems that are economically viable, environmentally sound, and good for communities and families.

The Western SARE region has a diversity of agriculture and a broad geographic range that encompasses 13 states and four pacific island protectorates. Western SARE manages five grants programs: Research and Education; Farmer/Rancher; Ag Professional + Producer; Professional Development; and Graduate Student. All grants programs address the same goals:

- Promote good stewardship of the nation's natural resources using site-specific, regional, and profitable sustainable methods.
- Enhance the quality of life of farmers and ranchers and improve the viability of rural communities.
- Protect the health and safety of those involved in food and farm systems.
- Promote crop, livestock, and enterprise diversification.
- Examine the regional, economic, social, and environmental implications of adopting sustainable practices.

In 26 years, Western SARE has awarded over $50 million toward ground-breaking projects cooperatively conducted by producers, ag professionals, and researchers, and created an extensive learning center to ensure that research results are easily and rapidly accessible.

ADDITIONAL PROJECTS

More information about Western SARE's extensive project portfolio addressing livestock, grazing management, and other agricultural issues can be found at westernsare.org/projects.

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