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# Rangeland Management Strategies



**Ray Marxer, manager of Beaverhead Ranch in Montana, won an environmental award for using grazing systems to reduce erosion, increase forage quality – and increase stocking rates by 8 percent.** – Photo by Edwin Remsberg

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THE AMERICAN WEST EVOKES IMAGES OF VAST VISTAS, unyielding independence and quiet authority, a region that is at once easy to define and hard to comprehend. Within this awesome world of grass and sagebrush, which comprises 80 percent of the area from the Great Plains to the Pacific Ocean, a new kind of landowner is emerging to apply practical principles to generate profits while renewing the range.

People like Nevada rancher Agee Smith have worked hard to better understand the complexity of the range so they can coax a living from the land while leaving the delicate landscape in better shape after they're gone.

"I didn't know the land at all," Smith recalls. "I'd never got down on my knees to look. When I did, I saw insects, different plants, the soil. Everything is interconnected, and there's a reaction for every action you take in this interconnected chain."

When his 35,000-acre ranch near Elko was being squeezed by economics and environmental regulations, Smith re-tooled. He began focusing more on his land base than his herd size.

Now, Smith takes what he's learned and demonstrates some of his key strategies to agricultural educators. Smith hosts numerous training events at his ranch, some of them sponsored by the Sustainable Agriculture Research and Education (SARE) program, and involves a multi-disciplinary team in overall ranch management.

"Research provides the pieces to the puzzle," he says. "I don't know what the puzzle will look like when it is finished, but my job as an operator is to take all the pieces and put them together as a whole."

Still, Smith faces the same fundamental limiting factor confronting all business people: environmentally sound management must pay for itself. So the Smith family and others recommend the following strategies to create a truly sustainable range management program:

- Set clear goals
- Understand the plants and their needs
- Graze with various livestock species
- Monitor the vegetation
- Protect soil and water
- Work with other experts

Farmers and ranchers across the American range are testing and adapting forms of the Smiths' model on their landscapes. Much of that experimentation has been spearheaded by SARE-funded research into range management techniques that pay long-term benefits to people, their land and their communities. This bulletin from the Sustainable Agriculture Network outlines some of that research and recommends strategies that may work on your farm or ranch. See the end of each section and RESOURCES, p. 16, for a list of more in-depth materials.

## SET GOALS

EVERY SUCCESSFUL BUSINESS FOLLOWS A FORMULA FOR achievement, and that formula starts with setting goals. In fact, people who write down goals earn nine times as much over their lifetimes as people who don't, says Dave Kohl, professor emeritus at Virginia Tech and a well-known business consultant. Yet, 80 percent of U.S. residents say they don't have goals, 16 percent have goals but don't write them down, and only 4 percent write down their business and personal goals.

In agriculture, every consultant touts the same message: What do you want in life? Yet, many producers miss that message and set production goals such as weaning weights, carcass quality or pregnancy percentages instead of thinking more broadly about how they want their ranch to contribute to their lives. The Western Integrated Ranch Education program (WIRE), begun in 1992 and funded by SARE two years later, helps spread the goal-setting message.

WIRE, a combined effort by Wyoming, Montana, Colorado, Idaho and Utah Extension, teaches ranchers to manage the complex factors that influence every agricultural business. Adapted from the Texas Total Ranch Management program, WIRE better fits conditions in the West, integrating the physical, financial, biological and human resources within each farm or ranch operation. Instructors hope participants walk away with a plan to focus all of their resources toward specific personal, family and business goals. SARE funded instructor-team trainings and program expansion.

"Participants are generally more open to new ideas and are not as threatened by the changes that seem to be ever increasing in our rapidly globalizing economy," says John Hewlett, a farm and ranch management specialist at University of Wyoming who coordinates the WIRE effort. "Put another way, they are empowered to steer their agricultural enterprises toward the goals they see themselves achieving."

For more information about the Western Integrated Ranch Education program, see [agecon.uwyo.edu/wire/](http://agecon.uwyo.edu/wire/).

In setting individual goals, range managers should start by considering:

- How they want to spend their time
- What they want for their families
- What they want to accomplish in life

Then, they should consider how their range and other resources can contribute to those goals. When applying goal-setting principles to ranching, landowners should realize above all else that every ranch is different. Each must be managed according to the needs of the natural resource base as well as personal goals.

Jim Freeburn, a rancher and director of SARE's Western Region Professional Development Program and the University of Wyoming's Sustainable Agriculture Research and Extension Center, stresses the hard work involved. "You pretty much get out of life what you put into it," Freeburn says. "If you want something, you have to work hard, sacrifice and make a long-term dedication to a cause."

Wyoming rancher Ogden Driskill's father was the one who realized 30 years ago that their ranch was the linchpin holding the family together.

"Our family has been on this ranch for 130 years now," says Driskill, who ranches near Devils Tower National Monument and won a SARE grant in 1995 to improve rangeland health. "Our top priority is perpetuation of the ranch as a tool for future generations. That goal changes our approach to management and inheritance issues."

**The Driskills – from left Andrea, Lincoln, Rosanne and Ogden – have made stable ranch transfer a top goal, recognizing the land's contribution to the family's quality of life.**

– Photo courtesy of the Driskills



## PRODUCER PROFILE: STEEP LEARNING CURVE PAYS OFF

Fourth-generation Nevada rancher Agee Smith thought he knew the 35,000 acres that comprise his family's ranch like the lines on his palm – until he attended a Holistic Management (HM)<sup>™</sup> workshop in Elko.

“That was a changing point in my life,” says the co-owner of Cottonwood Ranch.

Smith's realization in 1995 became the foundation for his management decisions ever since. It complicates decisions, making range management “daunting, challenging and exciting,” Smith says, because one decision will affect every aspect of the family operation.

Smith and his wife, Vicki, attended the HM course after his father went to one and then encouraged them to go. At the time, the Smiths were battling with the Bureau of Land Management and the Forest Service over mandatory cuts in their cattle grazing permits. Both agencies supervise grazing permits for the ranch, and one permit covers designated wilderness in the Jarbidge Mountains.

“They had cut our numbers to below 300 cows and this operation was no longer viable,” Smith says. “I was tired of the fight. Life is too short.”

As a part of his new management philosophy, Smith tried something almost unheard of in the contentious environment of Nevada's public land management: He invited everyone who was interested in the natural resources on the family ranch – environmental groups, agency personnel, and university and extension people – to create a collaborative management team.

“This is a decision-making body, not just an advisory team,” Smith says of the people who direct major decisions on his 1,200 acres of private land as well as 34,000 acres of public land. “Now we have problem-solving meetings, not barrier-type meetings. We all at least respect one another and a lot of us are good friends.”

Smith counts this unusual team of managers as one of his biggest successes. “A lot of people want to do this, but can't get it off the ground,” he says. “And sometimes an agency will say it takes too much time. It does take time, but so do court rooms.”

The group's decisions have been right, at least some of the time. The Smiths have tripled the number of cattle they run. Still, net income was a problem. So, in 2000, the Smiths started a 100-horse guest ranch. Agee's sister, Kim, supervises the recreation enterprise, which attracts mainly young people with children and retirees. They also host business retreats and natural resource workshops.

After the first six years of operation, the recreation enterprise on the ranch provides about half of the income – and with better marketing it could be significantly more, Smith says.

“There's a lot of potential growth in the recreation business,” he says from the ranch headquarters that sit 70 miles from the nearest post office and 30 miles from a paved road.



Kim and Agee would like to run more natural resource classes at the ranch. Agee is especially proud of how the riparian areas have improved on the miles of creeks that traverse the ranch – although he is quick to point out that some spots still need work.

“As a kid, I remember the creeks with a lot of bare ground and maybe one or two willows,” he says. “Now, the willows, sedges and rushes are there along most of the creeks.”

The rehabilitation, he says, is all because of rest. Not total rest, he adds, but at least not grazed continuously. “Always have your riparians go to bed with hair on. In other words, leave the stubble high enough to catch sediment in the spring.”

As the fourth generation on a five-generation ranch, Agee understands the critical importance of intergenerational communication. His parents, Horace and Irene, still participate in the ranch management, and Agee hopes his two kids – who, with a niece, now tend cattle and help with special events – will find a permanent place at Cottonwood Ranch.

“When you criticize past range conditions, you have to be sensitive to the generation who was in charge then,” he says. “They were doing the best they could with the knowledge they had. It's easy for them to take your words as ‘you were doing it wrong.’ That's not it at all. Now we just have so much more knowledge.”

“And someday we may be in the same boat,” says Vicki.

For more information about the Smith family's Cottonwood Ranch, visit [www.cottonwoodguestranch.com/](http://www.cottonwoodguestranch.com/) or call the ranch headquarters at (775) 752-3135.

**Nevada rancher Agee Smith developed a diverse team to help manage his ranch's fragile resources. Improved management helped convince public land regulators that Cottonwood Ranch could maintain its stocking densities.**

– Photo by Mona Whalen

## TO-DO LIST

Just like making a New Year's resolution, you can improve your family life, your business and your rangelands by taking these steps:

- Set clear, succinct goals. Ask yourself: What do I want from life in general and this operation specifically?
- Prioritize your goals and determine the cost of each one.
- Evaluate your resources (see list below).
- Determine the aspects of your life that you can control – the weather vs. livestock numbers, the global economy vs. a business budget, government policy vs. your education. Realize there are aspects you can not control.
- Develop a plan for tomorrow, and for one year, five years and 10 years.
- Schedule a time to review your goals and your progress toward them.
- Evaluate your goals and plans. Is this where you want to go? Will your plan get you there?
- Set a specific time to evaluate again at least once or twice a year.

Goals help people stay focused and proactive, creating a clear path to results instead of allowing a shotgun approach to vague possibilities. They clarify what is important and provide a basis to evaluate decisions and actions.

Driskill's goal to keep the ranch in the family led him to redefine his ranch's worth, focusing on the land's contribution to his extended family's quality of life.

"This ranch is a tool for family members to utilize for their lifetimes," he says, because the ranch will not be sold.

Once a manager has established goals, the next step is to evaluate any and all resources, including:

- natural resources – soil, water, range, climate and crops
- livestock
- wildlife
- equipment
- finances
- most importantly, the people involved

A written list of goals and resources leads to enterprise decisions:

- Which competitive advantage does the business enjoy using the available resources?
- Would sheep fit the range better than cattle and be more profitable if they were rented out to manage weeds?
- Can we improve marketing?
- Is it better to make more money with a ranch recreation enterprise or accept the risks of an up-and-down cow-calf market to avoid dealing with dudes?

Driskill's Bearlodge Cattle Company supports three families, and the Driskills are working on creative ways to bring two more families back home. The Driskill family adheres to a rule that each additional family needs to

generate about \$40,000 in additional income from an enterprise before the ranch can support them. For example, Ogden's brother, Matt Driskill, operates a campground on the ranch to generate more income.

"Most ranches have the potential for additional income if you look at other opportunities besides raising livestock," Ogden Driskill says.

The next step is to make a plan to reach those goals. A complete plan lists action items for tomorrow, a year from now, within five years and within 10 years. Give every major change in a business three years to work out the kinks.

Driskill needed to increase carrying capacity on his ranch before it could support three families. Leafy spurge, a prolific noxious weed that propagates through roots and seeds, had reduced the ranch's livestock forage by about 80 percent. The most ecologically sound – and therefore best long-term – solution was to control the leafy spurge that covered about 95 percent of the ranch. With the help of a Western SARE grant, Driskill joined with his neighbors to develop a weed management plan through coordinated resource management. Their secret weapon: sheep.

"Until the grant, we were trying to control all of that spurge with chemicals," he said. "But chemical control doesn't make sense on large heavy infestations." They introduced a herd of sheep, which reduced the spurge to about 10 percent. "We're one of the few success stories of old-time infestations around here."

Driskill now runs about 700 sheep year-round. Two other neighbors also now use sheep for leafy spurge control.

Finally, a successful manager will periodically evaluate stated goals, adjust them if needed and plan again.

"The coordinated resource management was instrumental to us because it brought attention to a lot of things that we didn't see ourselves, but eventually realized had been there all along," Driskill says.

## UNDERSTAND YOUR RESOURCE – WHAT PLANTS NEED AND WHEN

RANGE PLANTS – THE GRASSES, FORBS AND SHRUBS THAT predominate on arid landscapes – have adapted to the seasonality of rainfall and temperatures. On warmer rangelands that typically receive summer rains – the Great Plains and the Southwest – the warm-season native plants mostly grow in July and August. In the Great Basin and along the Rocky Mountain Front where most of the moisture occurs before July 1, cool-season plants predominate, and 98 percent of the forage production occurs by the end of June.

By being aware of what range plants grow on your ranch, and what they need to thrive, you can plan to take advantage of each species' niche.

In Texas' slice of the High Plains region, water scarcity drives decision-making for farmers and ranchers. Researchers at Texas Tech are experimenting with warm-season grasses and innovative rotations of cattle and cotton to stretch their aquifer-dependent water supply. Vivien Allen, a Texas Tech researcher who has won two SARE grants, is testing Bermuda grasses, Dahl bluestem and Tifton 85, which are water-efficient and saline-tolerant. "It's hot, it's dry – that's what's adapted out here," Allen says.

Nebraska hosts both warm- and cool-season grasses, so Overton producer Teri Edeal used SARE funds to experiment with both types by dividing her quarter-section pivot pasture into eight paddocks. Her first seeding mixture was mostly cool-season grasses, causing a forage shortage for Edeal when those grasses quit growing in July. So she reseeded with *Bonanza*, a new variety of big bluestem.

"*Bonanza* is a warm-season grass so it should fill the gap in July and August," Edeal says.

Regardless of the season of most growth, all range plants need to be grazed and experience periodic rest from grazing during the growing season to remain healthy and productive.

Grasses and forbs are especially vulnerable to harmful grazing during the boot stage, when the seed head is

rapidly shooting up from the base of the plant to the pinnacle. Almost all of the plant's energy goes to the stem and seed head. If leaves are grazed during this period, the plant can not photosynthesize enough energy so it draws from the roots, potentially weakening them.

Similarly, repeated grazing during the growing season is hardest on grasses because the plant keeps using all of its energy to grow new leaves, drawing energy from the roots and endangering their health. Various species need different lengths of leaves to photosynthesize enough energy to balance leaf and root growth, but a good rule of thumb is that leaves need to be at least 2 inches long before they provide enough photosynthesis for healthy roots.

The take-home message for sustainable grazing is to consider such factors as plant physiology, climate, season and your goals and develop a plan for grazing each plant in a way that sustains both the plant and the herd. For example, consider a plan that specifies grazing a given pasture in June one year, then during a different month next year.

"Instead of designing a grazing plan around the time a plant is grazed, you should design it around the amount of rest," says Agee Smith, the Nevada rancher.

Researchers continue to test the rest and grazing requirements of various species so landowners can apply optimum grazing practices to their local preferred plants, but land managers are behind the eight ball. With a lack of understanding about plants' fundamental



left to right

Warm-season grasses like Big Bluestem, a prolific high-quality forage, grows well in mid-summer when cool-season species go dormant.

— photo by NRCS



A key to good grazing plans is designing a cycle that includes resting and grazing plants.

— Photo by Ron Daines



**To revitalize her pasture and improve wildlife habitat, SARE grantee Jane Koger began a patch-burning program that mimics historic patterns.**

— Photo by NRCS

needs, historic grazing practices often encouraged less desirable species and even noxious weeds. Now, ranchers are playing catch-up to not only graze optimally, but also remediate past grazing practices.

“Vegetation change is slow,” says Tim DelCurto, a researcher at Oregon State University’s Eastern Oregon Agricultural Research Center. “You don’t see the impact [of improper grazing] at first. We’re just starting to understand the systems.”

DelCurto and Pat Momont, Extension Beef Specialist at University of Idaho, received a SARE grant to study better ways to manage beef cattle grazing in mountain riparian ecosystems.

In ongoing experiments, researchers continue to try to describe range ecosystems and how grazing affects those systems. Since 1916, many scientists subscribed to the theory that grazing practices are the most important influence on range plant production and species composition. Frederic Clements, whose continuing influence is evident in most range management textbooks, advanced this model; however, he developed his idea on pasturelands with consistent, predictable rainfall. Since the 1990s, others have developed the State-and-Transition theory for areas with less predictable rainfall that recognizes drought’s huge influence on plants – much more than grazing. This theory suggests that ecosystems typically retain a relatively stable mix of plant species unless a drastic change forces a new set of species. On western rangelands, that forceful change often comes in the form of drought.

Now scientists recognize that ecosystems fall on a continuum between these two theories, depending on the frequency and severity of area droughts. Moreover, they see the significant impact of other management

tools besides cattle grazing – logging, tillage, multi-species grazing, noxious weed control and burning, among others.

Within Kansas’ tallgrass prairie, area ranchers traditionally burn their prairie pastures each spring, stimulating plant growth and increasing palatability before summer grazing. Jane Koger of Matfield Green, Kan., has stopped burning her entire acreage each spring to better manage her cattle and preserve the ecosystem, along with some of its unique birds.

Koger, who raises a herd of 85 cow-calf pairs on 4,000 acres of tallgrass prairie, developed a patch burning system to maintain a shifting mosaic of burned and unburned, grazed and ungrazed areas.

Kroger and an advisory team of another rancher, a youth partner and representatives from the U.S. Fish & Wildlife Service, Natural Resources Conservation Service and The Nature Conservancy, decided to improve wildlife habitat and revitalize Homestead Ranch pastures by burning a third of each of her 960-acre pastures each spring. They started by surveying 80 square miles to assess the impact of annual burns. They found 90 percent of the available grassland had been burned, reducing migratory bird nesting and feeding habitat just when the birds need it most.

In 2004, the team began patch-burning, following a burn plan developed with NRCS. The plan used an aerial mapping system to segment Koger’s acreage using natural borders like roads and low-lying areas where water accumulates. The team’s work was supported by a SARE grant.

The patch fires mimic historic patterns in nature and control the movement of the livestock, which migrate to the burned areas a few days after fire. The new growth is more palatable than grasses that typically grow 3 feet high, said Koger, who saw her herd spend 80 percent of their time in a just-burned patch. Moreover, patch burning leaves two years of old-growth grass, creating more fuel for a hotter burn in the next cycle to destroy trees and other invasive, woody species.

“Patch-burning naturally guides grazing,” Koger says, referring to the tendency of livestock to seek fresh vegetation, then gravitate to the unburned sectors as the amount of forage in the burned sector declines. “It’s what the Native Americans did to attract the buffalo. We’re just following the historical burning to attract the animals.”

The patch-burning is good for the birds, too. Results of bird sightings and bird calls reveal an increase in bobwhite, eastern meadowlark, grasshopper sparrow and greater prairie chickens. They also sighted the

Henslow's sparrow, which Koger called "a unique harbinger of prairie integrity, requiring unburned, lightly grazed native prairie."

To learn more about plant needs and manage grasses, forbs, shrubs or trees, visit:

- Society for Range Management, [www.rangelands.org/srm.shtml](http://www.rangelands.org/srm.shtml)
- Natural Resources Conservation Service PLANTS database, <http://nrcs.plants.usda.gov/>
- NRCS Plant Materials Program, <http://plant-materials.nrcs.usda.gov/>

## IMPROVE YOUR RESOURCE WHEN YOU CAN — SALINITY SOLUTIONS

WHEN NEBRASKA PRODUCER TERI IDEAL PURCHASED A QUARTER section of irrigated bottom ground and applied for SARE funds to experiment with cool-season irrigated grass mixes, her neighbors were her biggest skeptics. After all, they reasoned, that piece of ground measured about 8.5 to 9 on the pH scale, way too saline for plants to grow. Edeal – who works with her husband, Brian, to feed 3,500 yearlings up to finished weight for other owners each year – persevered, planting saline-tolerant varieties that could be grazed and eventually reduce the soil salinity.

"Since 1998, we've grazed that pasture every year, and the neighbors have quit whispering to my husband," Edeal says. "And that pasture has been a life-saver during this drought."

Edeal planted a complex mix that included tall wheatgrass, Garrison creeping foxtail, intermediate wheatgrass, Russian wildrye, orchardgrass, birdsfoot trefoil and Alsike clover. The species will thrive in saline soil, and even transfer the minerals that are toxic to other plants from the soil to their stems and leaves. When these plants are grazed or harvested for hay, the salinity leaves with the plant.

Edeal may have reduced salinity, but she is still working to develop the best combination of species. The tall wheatgrass – the least palatable species for most of the grazing season – has taken over, and most of the legumes have essentially disappeared. Typically, legumes can be grazed short, but not often. Meanwhile, tall grasses such as those Edeal planted can be grazed often, but not short. In Edeal's rapid 16-paddock rotation, the legumes could not withstand the grazing pressure.

Edeal planted her forage mix in the fall so she could graze it the next June. Moreover, she wanted the grass established before weeds gained a huge competitive advantage. In 2002, a renter grazed 160 cow-calf pairs

on the property. Those calves gained 2.8 pounds per day, bringing the renter's net income to more than \$34,000. As landlords, the Edeals netted – after fertilizer, irrigation and mortgage payments – \$2,366.

"The next year, we added some of our own cattle so we could increase our income substantially," Edeal says.

If she had to do it over again, Edeal would start with eight paddocks under her 130-acre pivot instead of 16. Also, she would limit her seed mix to two or three varieties of grass – including, of course, a warm-season variety to carry her grazing capacity through the hot summer months.

## FORAGE KOCHIA COUNTERS SALINITY, EXTENDS GRAZING

SEVERE SALINITY AFFECTS MORE THAN JUST NEBRASKA. IN FACT, much of the soil across the Plains and Great Basin tests above 7.8 pH, creating difficult conditions in which to establish most forage species. At the same time, winter feeding costs on Intermountain West rangelands can reach as high as 50 to 70 percent of the total cost of raising a cow each year. Ken Olson, Dale ZoBell and their colleagues at Utah State University received a SARE grant to test saline-tolerant forage kochia as a winter feed in an effort to use saline soils more efficiently and extend the grazing season – a double bonus.

Extending the grazing season into the fall could save \$47-\$90 per cow, according to their economic analysis. The limiting factor to extending the grazing season becomes nutrition; if a cow loses too much body condition, a dollar saved in the fall could cost as much as \$2 to recoup in the spring. Grass loses protein and

Saline-tolerant forage kochia fills a nutritious, palatable niche during winter, as Utah State researchers found in a SARE-funded study.

– Photo by Blair Waldron, USDA-ARS



energy during its dormant season, but saline-tolerant perennial forage kochia retains nutrients during the fall and becomes more palatable – a characteristic that producers in Kazakhstan and Uzbekistan have realized for centuries.

SARE funded a November-through-January grazing test on former cheatgrass stands in Utah to answer questions about forage kochia's ability to establish and contribute to cattle performance. While research is ongoing, findings thus far indicate that forage kochia not only grew on saline soils, but it also contributed to cattle weight gains when paired with crested wheatgrass. Moreover, the high moisture content of forage kochia means that it can act as an effective fire break, especially when compared to stands of dry cheatgrass. Perhaps most important, researchers found that producers seeding the shrubby forb could save about 10 percent on annual production costs.

"We expect producers to incorporate kochia into pastures that are used for winter grazing to improve the nutritional value in stands that are grass-based and therefore low quality when dormant during winter," says Olson, now an extension beef specialist at South Dakota State University.

### THINK CREATIVELY – WINTER GRAZING STRATEGIES

FALL AND WINTER GRAZING HELPS RANGE PLANTS BY ALLOWING them to rest during the growing season, and then be grazed while they are not trying to restock energy to leaves and roots. Livestock tend to graze more shrubs in the winter, so producers gain forage on shrubby rangelands, too. However, winter forage often will not provide enough nutrition for third-trimester and lactating cows. The solution, according to Mike Smith, a University of Wyoming researcher who received a SARE grant to study calving options, is to calve later in the year and avoid having third-trimester and lactating cows in the winter.

"Late-season calving in most of the West saves anywhere from a few pounds of hay every day if snow covers the ground to the ability to switch to a completely forage-based operation because the cattle have lower nutritional demands and can maintain their condition with dormant grasses," Smith says. "Later calving also means less labor during calving because most cows can calve alone in warm weather."

Smith found that combined hay and labor savings lowered the break-even price to 50 cents a pound on 500-pound, May-calved and fall-weaned calves. That price, he emphasized, was an example from just one ranch in a given year.

"Lower break-evens do better in good times and (help producers) stay in the game in bad times," he says.

Smith used his SARE-funded research to demonstrate the benefits of matching a cow's highest nutritional needs with the best nutrition offered from forage to Wyoming ranchers Kelley O'Neill and Mike Crimmins. Keeping their eyes on that prize helped O'Neill and Crimmins overcome several obstacles and switch their herd to late-season calving.

O'Neill, a shareholder in the Kelley Land and Cattle Co. of Wyoming (KLCC-WY) and Crimmins, ranch manager for 50,000 acres of private and public KLCC-WY land south of Saratoga, moved their calving season from February and March to May and June in 1994. They still wean during October and November and they retain the calves in a feedlot so they can capture the highest seasonal fed cattle market the next March and April.

Later calving meant adjusting their grazing on other public lands, too. The May-born calves could not travel the 25 miles to KLCC-WY's summer grazing permit at just one month old. So O'Neill and Crimmins now move their late-gestation cows to BLM lands in May, prior to calving, if each cow has calved for three years without difficulties.

In California, annual grasses grow while it rains from November through April. At the University of California Sierra Foothill Research and Extension Center, a demonstration ranch partly funded by SARE



Calving later in the spring allows cattle to maintain condition while grazing on winter grasses and forage.

– Photo by Ron Daines



uses the same principle of matching forage to nutritional needs to calve from early April through mid-May instead of following the traditional fall-calving schedule. Annual grasses lose their nutritional quality quickly – from 20 percent protein in March down to about 6 percent in August and 4 percent in the fall – so California ranchers who schedule fall calving are challenged to maintain cattle body condition.

By changing from fall calving to a combination of spring calving, summer breeding and late-summer weaning, SARE project participants actually increased the cows' body condition score prior to breeding instead of watching it deteriorate despite feeding bales, blocks and bags of protein cubes. Spring calves were 60 pounds lighter than their fall counterparts, but ranchers lowered their costs by not feeding a lot of hay to the spring-calving cows. The spring calves caught up to the fall calves by 11 months of age, suggesting that retained ownership after weaning might be the most profitable strategy to manage this enterprise.

"A challenge is how to manage cash flow if you are switching a fall-calving herd to spring calving since you will produce no income from the cows for a year," says Roger Ingram, a farm adviser for Placer and Nevada counties in Auburn, Calif., who led the SARE project. Solutions to this temporary financial dilemma include switching half of the cattle herd at a time so the herd generates at least some income each year, and careful planning and budgeting.

Participants in Ingram's California Grazing Academy, held at the research site, realized higher cattle prices and better-growing grass, thanks to more intensive grazing management. Participants used a high stocking density and short grazing periods on both rangeland and irrigated pastures. After two years, they increased grazing days by 64 percent while maintaining the same residual matter in each pasture.

"We generally managed for 90 days of rest during slow growth – from mid-May through February – and 30 days of rest during fast growth from March through mid May," says Ingram. "If we had slow growth in March due to lack of rain, we stayed with our 90 days of rest until fast growth finally occurred."

Every May, they took a paddock walk to determine the number of grazing days remaining before the next rains, and growth would start again in November.

Another potential benefit of calving with the grass is that late-calving cows are usually cheaper to buy than February- and March-calving cows. Instead of retaining heifers, Troy Stafford, a rancher from Riverton, Wyo.,



buys his neighbors' late-calvers, usually for a little over slaughter price.

"Frequently, these cows breed late because they produce too much milk, resulting in delayed cycling," Stafford says. "Cows and heifers are often culled because they are too good as mothers."

In the end, it all comes back to establishing goals and designing strategies to meet those goals.

"Sustainable ranching is not just later calving, but a change in mindset from the past, a paradigm shift," says Wyoming's Mike Smith.

To learn more, visit:

- [www.animalrangeextension.montana.edu/articles/NatResour/winter\\_grazing.htm](http://www.animalrangeextension.montana.edu/articles/NatResour/winter_grazing.htm) for examples of Montana winter grazing
- <http://ceplacer.ucdavis.edu/Livestock/> for the California grazing academy and more
- [www.extension.usu.edu/files/publications/publication/AG-2003-07.pdf](http://www.extension.usu.edu/files/publications/publication/AG-2003-07.pdf) to find out more about forage kochia
- [www.uwyo.edu/ces/PUBS/B-1076.htm](http://www.uwyo.edu/ces/PUBS/B-1076.htm) to learn the details about the KLCC-WY Co

### SEEK LOCAL SOLUTIONS

GRAZING FORAGE KOCHIA AND CALVING LATER IN THE SEASON are just two examples of reducing feeding costs for livestock. In other places, producers feed protein supplements, augment with cheap grain such as wheat midds or use mineral supplements to increase livestock distribution in a pasture.

Amanda Hancock works to find ways to extend fall grazing on crop aftermath at the North Dakota State University Central Grasslands Research Extension Center.

California Extension educators run annual grazing academies at the Sierra Foothill Agricultural Research and Extension Center, which highlights ways to match a cow's production cycle to the forage.

– Photo by Jack Kelly Clark

## RIPARIAN BEST MANAGEMENT PRACTICES



Timing, intensity and frequency: What do those terms mean and how, exactly, do you manage them? University of California-Davis researchers surveyed 300 successful ranchers as part of a SARE grant to learn real-world riparian management specifics.

Here's a list of the specific management techniques those producers use to take care of their riparian areas without sacrificing their uplands.

**Reduce stock density.** Smaller herds reduce potential damage to both grasses and shrubs and through less hoof action. Fewer cattle in a riparian pasture combined with grazing less frequently and rest between grazing periods adds a synergistic effect.

**Reduce grazing frequency.** Frequency refers to the number of times a particular plant is bitten. The most effective way to reduce frequency is to shorten grazing periods in a pasture. Strive to create a larger number of smaller pastures or use other techniques (see below) to shorten grazing periods and ensure adequate rest for the plants.

**Increase rest between grazing periods.**

During the growing season, perennial plants need a chance to recharge leaf area and root reserves. Perennial grasses need to set seed at least once every three years to maintain healthy vigor. Managers can allow this by incorporating rest into different times of the growing season.

**Herd livestock away from riparian areas.**

Even with a lower stocking density, livestock will congregate at the preferred areas – usually the shady, cool areas on hot days. One steer on a creek bank for 100 days will do much more damage than 100 steers on the same creek bank for one day. Moving cattle away from the preferred areas will improve grazing distribution across the whole pasture.

**Provide off-site attractants.** Feed salt, mineral or other supplements in under-used areas of the pasture. Move the supplements when the livestock have grazed the area enough. Off-site water will bring cattle out of riparian areas, too, even if it is as close as 100 yards from a stream.

“If we can extend our traditional grazing season for one month, we can save feeding 107,094 pounds of dry harvested forage,” she says.

She calculates that savings based on hay generally baled at about 15 percent moisture and assumes a 1,373-pound cow will eat roughly 40 pounds of feed per day. A herd of 100 cows will eat about two tons of hay per day.

Using the custom rates provided by NDSU Extension, a tractor with a loader costs about \$25 an hour to run, and Hancock estimates that it takes about one hour to feed a 100-head herd. With \$25 for equipment and \$45 per ton of hay, she estimates that it costs about \$115 a day to feed the herd.

At \$115 per day to feed cows harvested forages, “we have a savings of \$3,450 if we can even extend our grazing season for 30 days,” Hancock says.

So far, Hancock and her collaborators have used aftermath grazing of harvested corn, alfalfa and barley fields to extend their grazing season by three months and save \$10,350.

It might not work on every range, but in Devils Tower, Wyo., Ogden Driskill lets his sheep show the cattle where the forage is. Most producers will say sheep are followers not leaders, and it is true that each individual sheep will stay within about 50 feet of another sheep if possible. Yet in the rolling hills of Wyoming, the sheep travel where

cattle first avoid. Driskill's cattle follow the flock's trails to more forage so both classes of livestock – and the range – benefit.

“The sheep make trails the cattle will follow so the cattle find forage where they would never think to look,” Driskill says.

### TOLERATE CHANGE – WHERE THE GREEN GRASS GROWS

FOR MOST OF THE WEST'S LIVESTOCK GRAZING HISTORY, riparian areas were considered sacrifice areas – dung piles deepened under shady conifers, livestock trampled the deep-rooted sedges that held streambanks in place, and willows provided scratching posts until the branches broke off. Today, range managers realize sacrificing riparian areas means potentially fouling clean water, increasing the chance of severe soil erosion during spring runoff, reducing bird and big game habitat and killing productive livestock forage, not to mention the political fallout from other land users.

SARE funded a project designed to evaluate cattle behavior in riparian areas during early and late summers for Oregon's Tim DelCurto, his research collaborator, University of Idaho's Patrick Momont and their partners from the Forest Service, the Oregon and Idaho cattle associations, Extension and Idaho Fish and Game. They expected cattle behavior to change as they aged

and weaned their calves – that dry heifers and older dry cows would travel farther away from creeks and shade than running-age cow-calf pairs.

Surprisingly, heifers often did not seem to know where to find good grazing on the uplands and dry cows seemed lazier, lounging under the trees in the hot summer. Instead of dividing herds along age classes and grazing without regard to the season, the researchers recommend grazing mountain riparian areas earlier in the summer when temperatures are cooler as long as the riparian soils are not muddy. Cattle will graze the uplands, farther from the riparian areas, avoiding re-grazing each plant. Placing mineral supplements in upland areas helps draw cattle away from streams, too, especially later in the summer.

Besides protecting riparian areas from erosion and other environmental calamities, producers who remove livestock from riparian areas also reap the benefit of tapping formerly unused forage that grows on extensive and often rugged uplands. So researchers are investigating just what it takes to implement another inexpensive yet effective management strategy: selecting for cattle that like to travel the uplands and culling those “bottom dwellers.”

In Montana, Derek Bailey found that some individual cattle prefer to lounge around streams and water holes while others will perform just as well even though they expend more energy climbing hills to more abundant forage. Bailey, now at New Mexico State University, continues to probe techniques to identify and promote “hill climbers” individually and by breed for western cattle producers.

“Livestock can be compatible with natural resources,” says eastern Oregon’s Tim DelCurto. “It is all a matter of how to manage timing, intensity and frequency.”

### MEASURE RESULTS – MONITOR YOUR RANGE

THERE’S NOTHING SEXY ABOUT MONITORING, BUT THERE’S probably no other single action that will keep rangelands healthier than checking vegetation. Measuring annual livestock use, documenting climatic and other potential impacts to the vegetation and watching the long-term trend in range health will do more to suggest management actions than any other use of a rancher’s time.

Researchers know they face obstacles in getting private landowners on board.

“Monitoring on private rangeland hosts a unique set of challenges compared to the larger monitoring programs that are much more prevalent on public lands,” says North Dakota State University’s Amanda Hancock. “First and foremost, is the persistent question of ‘Why

should I monitor? Why should I care?’”

While public lands are subject to the scrutiny of the general public, private rangelands are often out of sight, Hancock says. “Why should a manager bother with the hassle of monitoring when there are no direct consequences if he or she does not?”

No federal agencies grant grazing permits or lease allotments on private lands, so the data collected are largely dependent on producer ambition and knowledge of rangeland ecology. While researchers encourage both quantitative and qualitative data collection, they often receive qualitative data such as repeat photo points because photos are simple, easy and require few technical skills. Ideally, Hancock and others would like to see rangeland managers install permanent transects, identify plants, clip biomass, determine cover class and analyze those data.

Acknowledging that detailed monitoring requires both knowledge and time, researchers like Hancock work with managers to set up practices they can do by themselves, such as repeat photo points, identifying eight to 10 key species and knowing indicator species for the plant communities in which they have permanent photo points established.

Nevada rancher Agee Smith agrees wholeheartedly with the importance of monitoring.

“How can you know what’s going on unless you monitor?” he asks. “We found that out the hard way after a

**Martha Artega, NRCS  
public affairs specialist,  
and Joel Torres, NRCS  
district conservationist,  
survey rangeland quality  
near Zapata, Texas.**

– Photo by NRCS



Arizona rancher Rich Collins has turned mandatory decrees to protect endangered species into a sustainable ranching plan that looks so good his once-angry neighbors are joining a coalition to collectively manage for healthy rangelands, better riparian habitat and improved livestock production. He did this by documenting the impacts of careful management while grazing his Forest Service allotments.

Four ranchers owned grazing allotments in the Red Rock Canyon on the Coronado National Forest when the U.S. Fish & Wildlife Service found the endangered Gila topminnow in the perennial, intermittent stream that provided most of the livestock water in the canyon.

“I assumed that if we protected the habitat and met our obligations of the formal agreement, we’d be okay,” Collins says. But, he soon found out, he was wrong.

“The net effect was that our numbers were cut in half, with no opportunity for appeal, and they fenced all perennial water so we had almost no livestock water in the canyon,” he says.

With help from a SARE farmer/rancher grant, the four ranchers hired range monitoring experts to conduct annual range health assessments, including monitoring plant species composition and annual production. The experts used the NRCS Similarity Index, which provides a guide for the types of vegetation to expect at an ecological site that is reaching its full potential. Technicians compared vegetation at sites

with matching soils, aspect and climate to each index site.

Then, the ranchers received funds from the Arizona Department of Environmental Quality to drill four wells, install more than 20 miles of new pipeline and build new fences to enable them to develop rotational grazing plans on each ranch. A key factor in getting the awards was the ongoing monitoring program that allowed the ranchers to document improvements in rangeland and riparian health, as well as reductions in soil erosion. The improvements benefited not only the 20,000-acre Red Rock watershed, but another 30,000 acres of adjacent public and private rangeland.

“The riparian areas have come back amazingly and the uplands have improved,” Collins says. “Monitoring showed we were in compliance on the public lands and helped us make management decisions on our private land, too. You have to manage the ranch as a whole unit.”

Although the Santa Cruz County ranchers almost lost their crucial grazing permits and resented the federal agencies for more than 10 years, the Canelo Hills Coalition has changed attitudes enough that members and agency personnel can discuss issues openly – and enough so five nearby ranchers recently joined Collins and his neighbors.

“We’ve got 115,000 acres in the coalition now, and we’re all pretty happy with the way things are going,” Collins says.

learned to use line transects, photo points, clipping studies, stubble height, cover, frequency and utilization cages to evaluate their ranches. They studied such things as animal and insect contacts, grazing use, stocking rates, forage production and riparian flood management during a two-day monitoring workshop.

The hard work paid off says Marvin Reynolds, a Colorado extension agent who served as a technical adviser for a SARE farmer/rancher grant project focusing on range improvement.

“The permittees on the forest were at risk of losing 33 percent of their time and number of head on the permit,” Reynolds said. “Because they began monitoring and have used the monitoring to assist in managing their herd, they have maintained the days and the number of head.”

During the severe drought of 2002, the permittees worked with the Forest Service to alter grazing patterns and ended up losing less of their annual allotment than their neighbors, Reynolds says.

Another positive benefit resulted from the mutual respect that grew between the landowners and the Forest Service when they could have become potential adversaries. “Before, it was all antagonistic,” Reynolds says, “whereas now, they cooperate.”

Beyond cooperation, the forest graziers’ work was held up as a pattern for other allotment holders in 2004 after the 2002 drought. The permittees train their range riders to monitor and evaluate pastures while working on the range. The Forest Service has allowed the allotment holders to move animals on their own when they felt a pasture was done.

The ranchers apparently think their monitoring efforts are worthwhile. “Over 25 producers are currently using some of the techniques they learned on some part of their operation,” Reynolds says. And of an additional 17 producers trained in these techniques at other workshops, 13 have said they are using one or more techniques on their land.

Several online sites offer range monitoring how-to’s. A few good starting places include the following:

- Tips on how to select key areas are listed at [ag.arizona.edu/pubs/natresources/az1259.pdf](http://ag.arizona.edu/pubs/natresources/az1259.pdf)
- *Riparian Health Assessment Method for Rangelands* (published by the University of California Division of Agriculture and Natural Resources) provides a visual assessment technique to evaluate riparian areas. [californiarangeland.ucdavis.edu/Publications%20pdf/8089HR.pdf](http://californiarangeland.ucdavis.edu/Publications%20pdf/8089HR.pdf)
- *Guidelines for Monitoring the Establishment of Riparian Grazing Systems* provides an outline of

fire burned 11,000 acres of our range. We needed monitoring data that we didn’t have for decisions we really needed to make.”

Producers need to monitor more than just their forage, says Hancock. Changes in the size of cattle over the years have made a huge impact on rangelands. Fifty years ago, cows were roughly 1,000 pounds. Today, although there is some regional variation, cows are closer to 1,300 pounds.

“Increased cattle size means a need for more feed, but most producers have not substantially increased their land base in the last 50 years,” Hancock says. “So we are beginning to see rangelands that are not being managed in a sustainable manner.”

In Colorado, 25 national forest grazing permittees from the Cumbres and LaManga Cattle Association

several monitoring methods that can be used to assess riparian health and measure change over time. [californiarangeland.ucdavis.edu/Publications%20pdf/8094Guide%20rip%20grz%20sys.pdf](http://californiarangeland.ucdavis.edu/Publications%20pdf/8094Guide%20rip%20grz%20sys.pdf)

👉 The *Rangeland Monitoring Manual* discusses several monitoring methods and how to interpret them. It can be found at [www.uwyo.edu/ces/PUBS/B1065.pdf](http://www.uwyo.edu/ces/PUBS/B1065.pdf).

## MULTI-SPECIES GRAZING

PROMOTERS OF MULTI-SPECIES GRAZING LOVE TO DISCUSS THE environmental benefits of managing vegetation for increased forage production, reduced fire fuel loads, better wildlife habitat and noxious weed control. However, some ranchers are now making money by offering their livestock grazing services.

While herbicides are an effective front-line weapon in the war on weeds in most areas, weed warriors decline to use them or hold back where the agri-chemicals might contaminate water or are too expensive to apply. In Idaho, in areas where herbicides are not traditionally used yet, noxious weeds are spreading rapidly. Cashmere goat producer Bonnie Jensen charges \$1 a day per goat to graze spotted knapweed and leafy spurge, typically providing herd sizes of 250 goats.

During Jensen's SARE-funded pilot project, the goats ate all of the knapweed buds and blooms on the Salmon City Water Works, the town's water source where herbicides are banned, in four days. Fewer than 5 percent of the plants bloomed again that year. Then the goats moved on to a 40-acre Bureau of Land Management test area and ate 90 percent of the leafy spurge. The spurge grew again that year, but did not flower.

Jensen employs a herder on horseback with two dogs. The herder moves the goats to the weeds so they consume a higher percentage of weeds instead of eating grass and shrubs.

"Most noxious weeds are not the problem, they're a symptom of how the land has been managed," says Don Nelson, project director for another SARE-funded multi-species grazing education project in Washington. "Cattle like to graze grass, but sheep also prefer forbs and goats prefer woody browse. If you know these preferences, you can inventory a site and create a future landscape using them as tools."

After Nelson introduced 30 grazing professionals to multi-species grazing techniques, one participant teamed up with a local rancher to clear 600 acres of knapweed and potential fuel for wildfires using sheep and goats. Another participant helped a ranch manager use goats to control young Russian olive trees – thorny sprouters that are hard to control with herbicides and fire. The ranch manager also used goats and cattle to graze bulrushes in standing water. The goats opened up the bulrush patches enough to dry them out, then the rancher grazed cattle there to knock down the rest of the "tules." Prior to the goat grazing, he never could dry the ground enough to drive a tractor through the bulrushes.

"We wanted to demonstrate a method of managing rangelands that would positively impact the triple bottom line – the environment, the ecosystem and society – by reducing input costs, increasing productivity and enhancing the ecosystem," Nelson says. "This includes conversion by ruminants of undesirable plants to marketable products and a reduction in herbicides."

*left to right*

**Bonnie and Stan Jensen rent goats to graze persistent weeds in Idaho.**

*– Photo by Ron Daines*



**Goats tackle perennial pepperweed as part of a SARE-funded project testing the effects of multi-species grazing on invasive vegetation at Barker Ranch in West Richfield, Wash.**

*– Photo by Craig Madsen*





**A combination of carefully managed rotations, soil-building and irrigation pipes helps Colorado rancher Mark Frasier survive periodic droughts.**

*– Range photo by Jill Auburn; portrait by Ron Daines*

### **HOPE FOR THE BEST, BUT PLAN FOR THE WORST – DROUGHT MANAGEMENT**

RECENT ROUNDS OF SEVERE DROUGHT ACROSS WESTERN rangelands have brought home the critical need for management strategies during times without rain.

For many, the knee-jerk drought strategy becomes a desperate attempt to keep the number of livestock stable no matter the lack of feed. After all, a banker needs to document a borrower's number of sheep, goats or cattle, not how much flesh the livestock carry. This crisis mentality often leads to degraded rangelands, lower birth rates, fewer pounds to sell and financial stress.

Instead, a more sustainable drought plan includes a two-pronged approach: protect the soil while maintaining a modest income over the long run.

A land manager can not protect the soil in one year. It takes ongoing effort to build organic matter in the soil and vigorous plants that can withstand the tortures of drought – including the drying winds and scorching temperatures that show up when the rain doesn't.

Mark Frasier runs 400 cows and 3,400 yearlings on his 29,000-acre Woodrow, Colo., ranch. He rotates his cattle through 190 pastures, spreading nutrients, trampling old stubble and guaranteeing rest to keep the grasses healthy.

"The cattle recycle nutrients and organic matter back into the soil, which helps the ground retain moisture," says Frasier, who serves on Western Region SARE's grant-making council. "We can't say when we are going to get rain, but we can prepare ourselves so that our soil is receptive and the plants are healthy enough to respond when we do."

The key to distributing livestock and providing enough rest – plants need more rest during dry periods – is reliable drinking water. Pipelines, wells and spring developments cost a hefty investment at first, but the payback comes in stronger – and more – grass.

With his investment in pipelines and a one- to three-day rotation system, second-generation rancher Frasier now runs more cattle on better grass. During Colorado's worst drought in 250 years, Frasier had to de-stock his ranch only one year.

"We're seeing a healthier landscape and we are just starting to increase the number of cattle we graze," he says. "Grazing more cattle on the same resource is going to have an economic advantage." Frasier, a devotee of Holistic Management™, says his improvements have lowered his cost of gain from 35 cents a pound to about 11 cents.

Planting pastures with drought-tolerant, introduced species will protect native range during a drought, too. So will moving livestock to rented pasture while the range needs rest. Moving livestock to grass is almost always less expensive than moving grass to the livestock.

Frasier also maximizes the second prong of sustainable drought management: optimize long-term income without sacrificing the range. Consider selling calves, lambs or kids, but by selling lighter weight offspring early, culling the base herd more severely or selling the base herd before a severe drought drops prices and then renting out pasture. Tax incentives can help producers buy a herd back after the drought ends.

While the best-laid plans sometimes go awry, the best drought strategy is to plan today for tomorrow's dry weather. The operative phrase on western rangelands is not if a drought comes, but when it comes.

### **LEARN FROM OTHERS**

ONE PERSON CAN'T KNOW EVERYTHING, SO SUCCESSFUL managers learn to rely on other experts. Some go as far as developing a formal team of advisers.

Duke Phillips, Colorado rancher and winner of the 2003 Colorado Society for Range Management

“Excellence in Range Management Award,” teams with experts in range monitoring, ornithology, mammalogy, entomology and botany to track ecosystem health on the 87,000-acre Chico Basin Ranch. Phillips uses the information to market his beef to urban, conservation-minded consumers along Colorado’s Front Range.

“This relationship is the bridge between the rural agricultural and urban-suburban community that Chico Basin Ranch believes must be created for many producers to remain economically viable,” Phillips says.

Teamwork pays off in other ways, too. Ranchers in Washington measure their “triple bottom line” of contributing to the environment, the ecosystem and society by using multi-species grazing to reduce

costs and increase forage growth. But finding local solutions to using sheep, goats and cattle to graze areas takes time, creativity and persistence. A SARE-funded project helped individual ranchers create management support groups to share their experiences, both good and bad.

“A training workshop can create awareness of new information or new ways to do things, but unless this learning is applied soon, people won’t change,” says Don Nelson, extension beef specialist for Washington State University. “Forming groups of people who can work together after the training workshops helps to create responsibility and accountability. If I tell my fellow support group member that I’m going to do something, I feel some responsibility to get it done.”

## THE SOCIAL ASPECT OF SUSTAINABLE LAND MANAGEMENT: TOHONO O’ODHAM’S STORY

Successful range management incorporates flexibility, mobility and reciprocity, particularly when the range is jointly owned. Then, management also becomes about maintaining relationships.

A participatory planning and education project funded by SARE on the Tohono O’odham Nation in Arizona highlights the power of personal relationships to influence land management on communally managed rangelands.

The Tohono O’odham Nation encompasses 2.8 million acres of Sonoran desert habitat, ranging from grasslands in higher rainfall areas of the eastern region to desert scrub that dominates the drier northern and western regions. For the last 300 years, livestock have provided a source of cash, subsistence, food for community feasts and ceremonies, social status and political clout.

On some parts of the nation, uncontrolled livestock grazing has degraded rangelands, accelerating erosion, facilitating mesquite invasions and replacing desirable plant communities with less palatable and less productive plants.

With cattle running in common, it is difficult to control grazing, provide rest periods and manage herd genetics. Thus, when the livestock are sold off



Jennifer Arnold Musa

the reservation, producers typically receive a price lower than the market price because of less desirable livestock genetics.

To improve range conditions, the nation was fenced into nine grazing districts during the 1930s, but local producers were not consulted. Traditional territories were split, causing economic hardship, provoking lasting resentment toward the government and creating animosity among some neighbors.

A SARE-funded project confronted the nation’s range management problems by addressing the unique social and environmental aspects of its rangeland

management. Using a participatory approach to planning and education, University of Arizona researchers facilitated dialog among tribal members and other range professionals to adapt range management principles developed in more productive grasslands to the environmental and cultural context of the Tohono O’odham Nation.

The resulting plan, based on findings that typical stocking rates have less influence on perennial plants than the variability of rainfall, emphasizes community cooperation rather than dividing the open range into individual allotments. Participants plan to build consensus for

herd management and controlled access to watering points.

The series of workshops, which combined scientific and local knowledge, created so much public support that an Agriculture and Natural Resources Program was initiated at the Tohono O’odham Community College. The workshop curriculum was expanded, forming the basis for an associate degree program.

The college developed its degree program using a participatory process modeled after the SARE project, says Jennifer Arnold Musa, who coordinated the SARE project. “Many of the community participants and elders who collaborated in the SARE project are still active members in program planning,” she says. “Some SARE project participants have gone on to take classes or even a formal role in the development of the AG&NR program.”

Two new faculty members have been hired to teach the classes and an extension agent is developing outreach activities for youth. Junior rodeos have been a big success in getting kids interested, and the college hopes that these activities will raise the program’s profile and gradually attract students to their program.

# Resources

**Sustainable Agriculture Research and Education (SARE) program.** SARE studies and spreads information about sustainable agriculture via a nationwide grants program and practical publications. (301) 504-5230; sare\_comm@sare.org; www.sare.org. See *How to Direct Market Your Beef* at www.sare.org/publications/beef.htm.

**Alternative Farming Systems Information Center (AFSIC).** Provides on-line information resources, referrals and searching. (301) 504-6559, www.afsic.nal.usda.gov. See "Grazing Systems" and "Alternative Livestock Breeds."

**ATTRA.** National information service offers 200+ free publications. Call (800) 346-9140; Spanish: (800) 411-3222; or go to attra.ncat.org for publications on pasture, rangeland and grazing management, multi-species grazing, drought, etc.

**Holistic Management International.** Helps farmers/ranchers enhance productivity and profitability of their land, publishes bimonthly *Holistic Management IN PRACTICE* and provides Holistic Management™ training. www.holisticmanagement.org.

**Native Habitat Organization.** Conservation group dedicated to ensuring a future for grazing cattle on desert, prairie and forest rangelands and protecting soil, water, native vegetation and wildlife from abuse. www.nativehabitat.org.

**Society for Range Management.** A professional society dedicated to supporting people working with rangeland. Provides reference books, practical handbooks, abstracts and proceedings, *Rangelands* and *Rangeland Ecology & Management*. (303) 986-3309; www.rangelands.org.

**The Stockman Grass Farmer.** Magazine covering the science of grass; finished and organic grass-fed beef; seasonal, pasture-based dairying; pastured poultry and more. (800) 748-9808; www.stockmangrassfarmer.net.

## GRAZING/RANGELAND MANAGEMENT

**Alberta Government Sustainable Resource Development.** Offers *Range Notes*, a periodical about findings and recommendations from research carried out by Range Resource Management Group, and other publications. www.srd.gov.ab.ca/land/m\_rm\_rangepasture.htm

**Foothill Rancher.** University of California newsletter focuses on livestock production and marketing strategies. http://ceplacerv.ucdavis.edu/newsletter/files/newsletter43.htm.

**Grazing Management: An Ecological Perspective** by Texas A & M University. Addresses the ecological concepts and management principles of good grazing management, with emphasis on Texas rangelands, although applicable to diverse geographical regions. http://cnrit.tamu.edu/rlem/textbook/textbook-fr.html.



**Great Plains Framework for Agricultural Resource Management.** USDA resource to evaluate farm/ranch management options, including agricultural databases; research and extension fact sheets; and more. infosys.ars.usda.gov.

**NRCS National Range and Pasture Handbook.** Procedures to help producers working through conservation districts in resource conservation on non-federal grazing lands. Also a general reference for grazing lands resource information. www.glti.nrcs.usda.gov/technical/publications/nrph.html.

**Natural Resources Conservation Service (NRCS) Grazing Lands Conservation Initiative.** Technical assistance on privately owned grazing lands. www.glti.org.

**Rangelands West.** The Western Rangelands Partnership delivers information, resources and tools to improve management and ensure sustainability of western rangelands. rangelandswest.org. Also see http://rangelandswest.arid.arizona.edu.

**Targeted Grazing Manual: A Natural Approach to Vegetation Management and Landscape Enhancement.** A website and handbook on grazing from the University of Idaho. (208) 885-4394; www.cnr.uidaho.edu/rx-grazing.

## WEED MANAGEMENT

**Multi-Species Grazing and Leafy Spurge** by USDA-ARS. Manual details using multi-species grazing as an effective leafy spurge management tool. www.team.ars.usda.gov/grazingmanual2a.html.

**Targeted Grazing: A natural approach to vegetation management and landscape enhancement** by the American Sheep Industry Association. How to use diverse livestock to manage rangeland vegetation challenges. www.sheepusa.org/targetedgrazing. To order a print copy, contact (303) 771-3500 or info@sheepusa.org.

**Western Rangeland Weeds Annotated Database** the Arid Lands Information Center at the University of Arizona in cooperation the National Agricultural Library. Database of research, guides and publications on weed impacts, policy issues, management, educational opportunities and more. alic.arid.arizona.edu/invasive/html/.

## RIPARIAN MANAGEMENT

**Rangeland Watershed Program Fact Sheets from the University of California.** Information on resource management, riparian area monitoring, water quality, etc. jmharper@ucdavis.edu; danr.ucop.edu/uccelr/htoc.htm.

SARE works in partnership with Extension and Experiment Stations at land grant universities to deliver practical information to the agricultural community. Contact your local Extension office for more information.

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