# Rangelands

Society for Range Management

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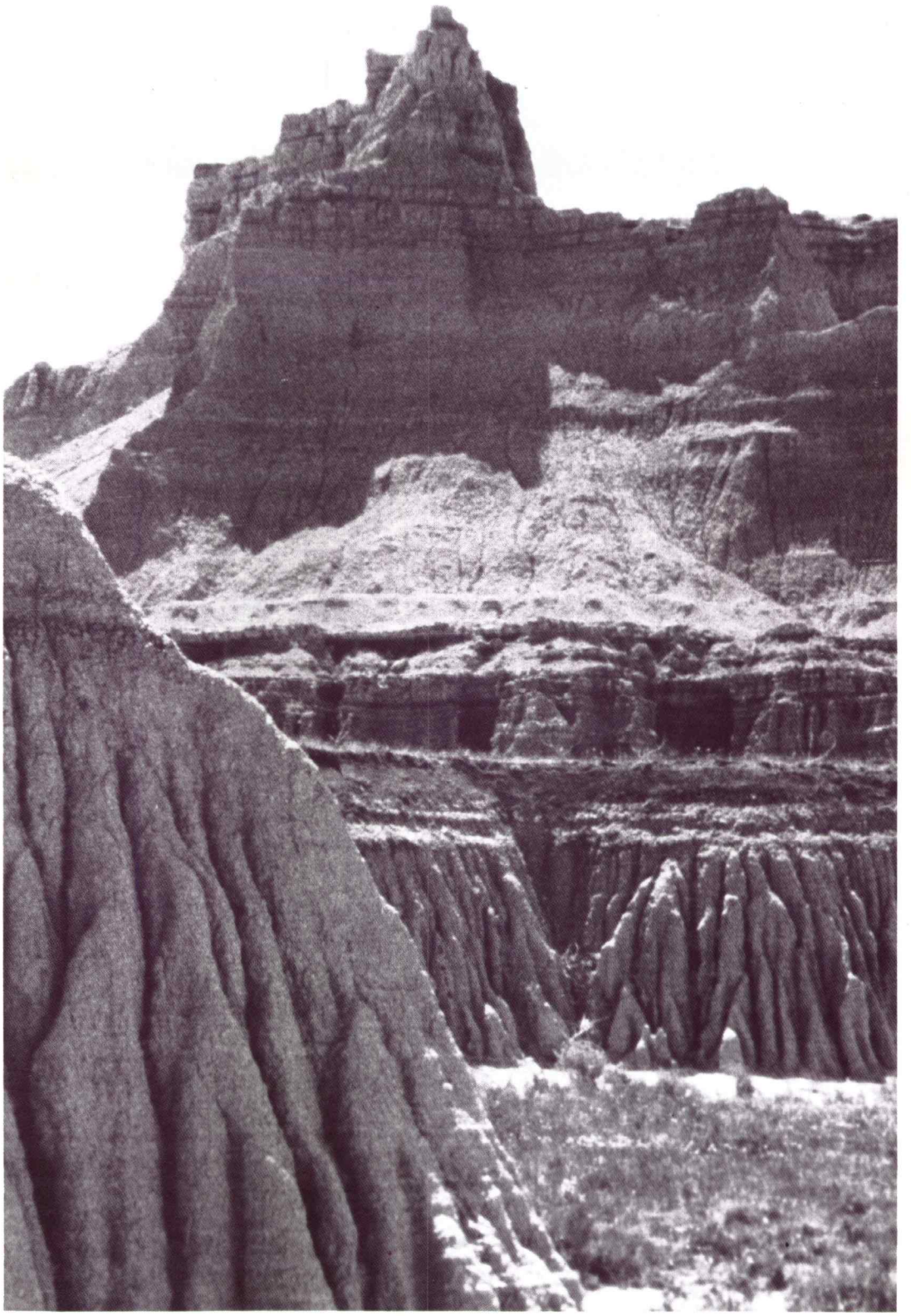
Richard M. Hansen



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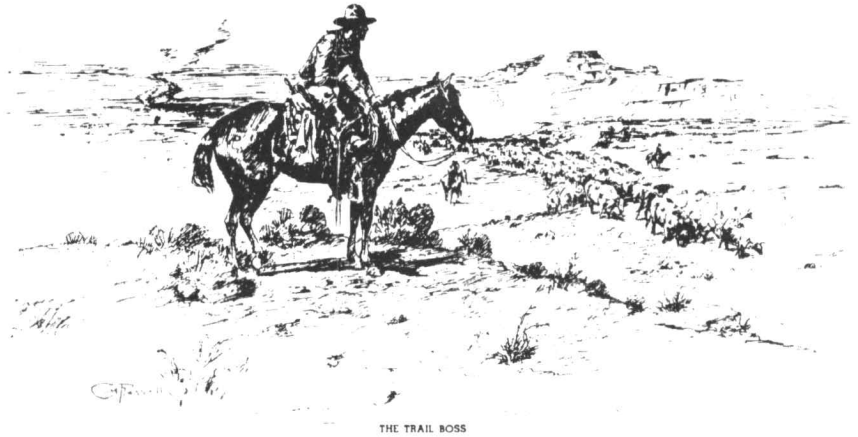
# SOCIETY FOR RANGE MANAGEMENT

Richard M. Hansen





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The objectives for which the corporation is established are:

*—to develop an understanding of range ecosystems and of the principles applicable to the management of range resources;*

*—to assist all who work with range resources to keep abreast of new findings and techniques in the science and art of range management;*

*—to improve the effectiveness of range management to obtain from range resources the products and values necessary for man's welfare;*

*—to create a public appreciation of the economic and social benefits to be obtained from the range environment;*

*—to promote professional development of its members.*

Membership in the Society for Range Management is open to anyone engaged in or interested in any aspect of the study, management, or use of rangelands. Please contact the Executive Secretary for details.

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Cover: Badlands landscape on Pine Ridge Indian Reservation, Washabaugh County, near Wanblee, South Dakota. See page 195 for South Dakota history and page 236 for details of the 1984 Annual Meeting, SRM, in Rapid City, S. Dak. Photo by F. Robert Gartner, May 20, 1981.

# They Came for the Gold and Stayed for the Grass

**Bob Lee**

AN ISLAND IN A SEA OF GRASS. That's how historians describe the Black Hills of South Dakota where the Society for Range Management will hold its 1984 annual meeting next February. That's because the incongruous mountain range rises like an island out of the sea of grass that surrounds it for hundreds of miles in all directions. They have also been described as "an oasis in a dreary desert." That's because of their isolation, sparkling streams, pine-forested slopes, and park-like meadows rising mirage-like from the stark prairielands enveloping them.

Known as "The Land of Infinite Variety," South Dakota is divided into three distinct physiographic regions. The Missouri River bisects the state from north to south in the central sector. The land there is an extension of the farmlands of Minnesota and Iowa. West of the river is the vast "short grass" country where bluegrama, buffalograss, and western wheatgrass support an enduring livestock industry. This region is also characterized by desolate Badlands, the legacy of millions of years of erosion from wind and water. Then there's the Black Hills, whose forests and grassy meadows offer a sharp contrast to the moonscape of the nearby Badlands.

South Dakota, part of the Louisiana Purchase, was included in Minnesota and Nebraska Territories until 1861 when Dakota Territory was created. Lewis and Clark traversed the region while boating up the Missouri on their celebrated trek to the Pacific Ocean in 1804-06. When the separate states of North and South Dakota were created in 1889, the southern sector was left with about 46 million acres—43 million of it still rangeland. The state forms a near rectangle about 225 miles north to south and roughly 460 miles east to west. It encompasses a surface area of 77,047 square miles.

THE BLACK HILLS, AN OBLONG AREA of about 4,500 square miles along the west-central border of South Dakota and eastern Wyoming, were formed about 40 million years ago. They were born in a massive eruption of the earth's bowels. The violent upheaval created a mountain range from the rocky bed of an inland sea that covered the region eons ago. The Cheyenne River grips the range between its north and south branches as it courses eastward out of Wyoming. While apart from them, the Black Hills are generally considered to be the eastern ramparts of the taller Rocky Mountains.

In truth, however, the Hills are also mountains. They were the "Black Mountains" to the early Indians of the vicinity, undoubtedly because of their dark appearance when viewed from a distance. It was the white man, coming much later, who reduced them to hills. The corruption may have resulted from comparing them with the loftier Rocky Mountains to the West. The whites were intimately acquainted with the towering snow-capped Rockies long before they discovered the lonely Black Hills. But there's no higher point east of the Rockies to the Atlantic Ocean than 7,240 foot-high Harney Peak in the granitic center of the Black Hills.

There is archaeological evidence of human inhabitation of the fringes of the Black Hills in pre-historic times. One site near Bear Butte, a towering landmark situated a few miles east of their outer rim, dates back 4,000 years. The first white men known to have pierced this long-hidden mountain range were the Verendrye brothers, noted French-Canadian explorers, who came to the region in 1742 while searching for a mysterious "Sea of the West." They found sub-bands of the Crow, Cheyenne, and Kiowa tribes scattered abut the "Mountain of the Horse Indians," which may have been Bear Butte.

MORE THAN HALF A CENTURY PASSED after the Verenrye visit before the white man again ventured to the Black Hills. There are sketchy reports of whites reaching or passing near them in the first half of the 19th century. Wilson Price Hunt led a party of Astorians to Oregon by way of the Black Hills in 1811. That intrepid adventurer, Jedediah Smith, was mauled by a grizzly bear while passing through the southern portion of the Black Hills in 1823. By the 1830's fur traders were passing along the Cheyenne waterways from the Missouri River to the Yellowstone. An American Fur Company outpost at the mouth of Rapid Creek, on the eastern fringe of the Hills, is known to have blown up in 1832. A candle falling into a keg of gun powder caused the explosion and killed the white trader.

It was more than a full century after the Verendyre visit that the first evidence was uncovered of white men in the Black Hills as gold prospectors. In 1887, at the base of Lookout Mountain near the presentday town of Spearfish, a small sandstone slab was found that told a cryptic tale. Crudely carved on one side of it was this message: "Came to these Hills in 1833 Seven of us Al ded (dead) but me Ezra Kind Killed by Ind. beyond the high hills Got our gold June 1834."

The same side listed the names of the seven. With the exception of an "Indian Crow," they were apparently all

*About the Author:* Bob Lee—Black Hills newspaperman since 1946—is past president and still director of South Dakota State Historical Society; a member of Western Writers of America; founder Black Hills Corral of the Westerners; author- editor, *Gold, Gals, Guns, Guts; Last Grass Fronteri; The South Dakota Stockgrowers Heritage; Tragedy Ends an Empire, Dakota Panorama;* and wrote a play, *The Court Martial of Major Marcus A. Reno.* Present position is editor and vice-president of Black Hills Publishers, Inc., and editor of *Tri-State Livestock News.*

*Brevet Major General George A. Custer Expedition to Black Hills (1874). At Ft. Lincoln, Bismarck, Dakota Territory, as it left there.*

white men. On the reverse side of the stone was carved this poignant information: "Got all the gold we could carry out ponys all got by the Indians I have lost my gun and nothing to eat and Indians hunting me."

The author of these frantic lines probably was later "got" by the Indian pursuers too. Who were these unfortunate adventurers and where did they originate? Frank Thomson, the late Spearfish author and historian, spent most of his 93-year lifetime trying to find out. Through prodigious research, he succeeded in tracing most of them. Like many others, before and after them, these tragic figures had "gone West" from the eastern settlement and "were never heard from again."

MEMBERS OF THE ILL-FATED KIND PARTY, as they are known to Black Hills historians, may have been the first gold-seekers to invade the mysterious region. But they were far from the last, nor were they the last to suffer the consequences of the lust for gold in the jealously guarded Indian country. Oddly, despite their idyllic environment, the Indians did not live in the Black Hills for prolonged periods. The Sioux, who had expelled the earlier tribes living in the region, lorded over the territory when the white man began coveting it. They were a nomadic people who roamed the Great Plains in constant search for the immense buffalo herds that sustained them. But the Black Hills were sacred to them and they made frequent pilgrimages there. Perhaps the country reminded the Sioux of their former woodland culture in the forested lands of Minnesota and Wisconsin where they had lived prior to migrating west of the Missouri River in about 1775-76.

In any event, game was plentiful in the Black Hills and the Sioux cherished them as their "Meat Pack." In addition, the level, wooded bottom lands cradled by tree-clad bluffs or ridges made ideal winter camping grounds. Here, too, the Sioux sought refuge from the relentless forces of the white

*Settlers took up homesteads on the vast West River grasslands after the Great Sioux Reservation was violated by the Custer Expedition to the Black Hills in 1874.*

man's civilization crowding in on them. In 1873, the Army proposed building a fort there even though it knew practically nothing about the region. But, the 1868 treaty with the Sioux consummated at Fort Laramie, Wyoming Territory, foreclosed that possibility.

The Laramie Treaty called for the abandonment of military posts in the Indian country rather than the establishment of additional posts. Red Cloud, war chief of the fierce Oglala Sioux, had led costly raids against the Bozeman Trail forts in Wyoming and Montana Territories. He vowed his people would not stop the fighting until the string of forts abreast of the trial were abandoned. He won his point along with an agreement that all roads leading through Indian country to the Montana gold fields would be closed.

Further, the treaty set aside all of the vast country west of the Missouri River in Dakota Territory, including the coveted Black Hills, for "the absolute and undisturbed use and occupation of the Sioux Nation." It also committed the government to preventing white encroachment on the region, with troops if necessary. The historic treaty effectively slammed the door on white expansion into the Indian country. It also dashed the hope of the white people of Dakota for settlement of the Black Hills—for a few years anyway.

JUST SIX YEARS AFTER THE LARAMIE TREATY had been signed by the warring parties, ending years of bitter conflicts between the Sioux and the Army, the now famous Custer Expedition to the Black Hills of 1874 was ordered into the field. The expedition, commanded by the flamboyant hero of Civil War fame, George A. Custer, was described as the best equipped on the Northern Plains up to that time. In addition to the Seventh Cavalry, the pride of the country's frontier regiments, the command included scientists, practical miners, a corps of newspapermen, and happily for history, a photographer. All told, the expedition familiarized about 1,000 men—and one woman, a colored cook hired by the teamsters—with the enigmatic Black Hills. The entourage also included 110 wagons, mules to pull them, horses to carry the soldiers, and a beef herd to feed the command.

Ostensibly, the purpose of the expedition was to thoroughly explore the interior of the Black Hills and to select a suitable site for a future military post. The expedition marched out from Fort Abraham Lincoln on the west bank of the Missouri River near present-day Bismarck, N.D., on July 2, 1874. It returned there on August 30 after covering 1,205 miles on the round trip. Custer and his troopers found much of interest in the Black Hills, including the pristine beauty of the region leading to them.

"We marched over beautiful country," Custer wrote in a field report on July 15. "The grazing was excellent and abundant... The pasturage could not be finer... As an evidence of the character of the country we have marched since leaving Fort Lincoln on an average of 17 miles a day, one day making 32 miles; yet our mules and beef cattle have constantly improved in condition; the beef herd depending solely upon the excellent grazing we have passed over."

THE EXPEDITION ENTERED THE BLACK HILLS from the west after crossing a veritable grazing paradise where it found "grass knee-deep and exceedingly luxuriant." It established camp on French Creek where the town of Custer, "Mother City of the Black Hills" was later sited. It was here on August 2, 1874, that Custer wrote the historic dispatch that reported "gold has been found in several places." The discovery marked the end of Sioux proprietorship of their beloved Black Hills, despite the promises contained in the Laramie Treaty.

Entering the Belle Fourche Valley north of the Black Hills enroute back to Fort Lincoln, Custer described it as a "superior country covered with the best of grazing." He later reported "men going to the Black Hills to engage in agricultural or stock raising pursuits need not fear disappointment. In no portion of the United States, not excepting the bluegrass country of Kentucky, have I seen grazing superior to that found in this hitherto unknown region." He also recommended that "the title of the Indian (to the Black Hills country) should be extinguished as soon as practicable." Strangely, however, Custer failed to even mention a possible site in the region for a future military post in his verbose dispatches.

News of Custer's sensational gold find electrified the nation and brought renewed demands for opening the Black Hills to white settlement. The government attempted to negotiate with the Sioux for sale or lease of the gold fields, but the Indians refused to sell their sacred lands. So the government withdrew the Army patrols that were trying, mostly unsuccessfully, to keep gold-crazed prospectors out of the Black Hills. The rush of whites into the region in clear violation of the Laramie Treaty brought attacks on the illegal settlers by the naturally resentful Indians. So the army was sent out to protect the invaders, an ironic twist from its previous mission of keeping the whites out of the region.

However, Custer and the Seventh Cavalry were to pay a high price for exposing the sacred land of the Sioux to the white intruders two years later on the Little Big Horn in Montana. Custer and much of his command were annihilated there by the Sioux and their Cheyenne allies on June 25, 1876. While that historic battle took place in Montana, the illegal opening of the Black Hills to white settlement was what the fight was all about. The Indians had fled the Great Sioux Reservation set aside for them by the Laramie Treaty after their cherished Black Hills had been violated, the Army pursued them into Montana and there suffered a stunning defeat. The unexpected Indian victory marked the high water mark of Sioux supremacy of the Great Plains.

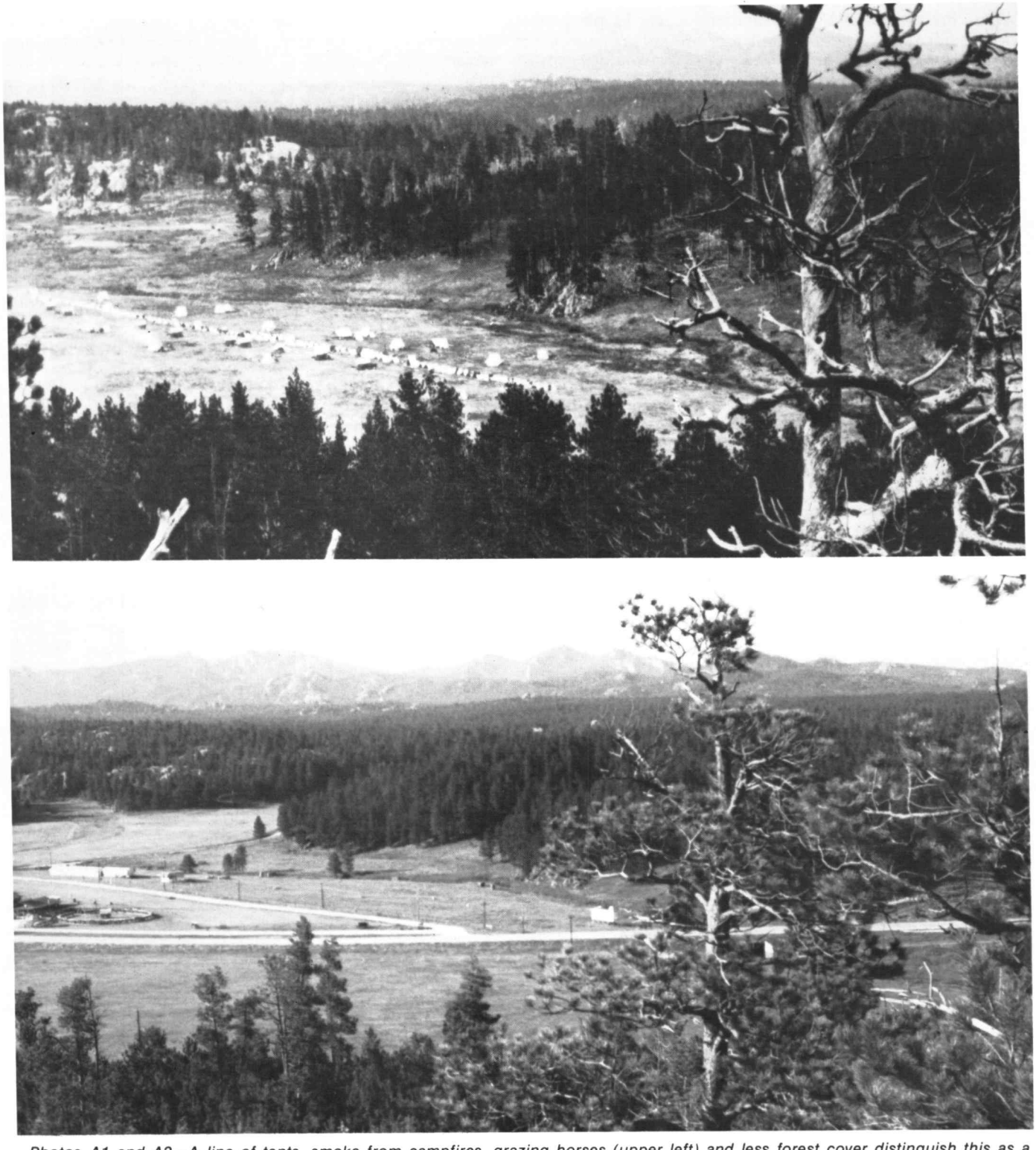
THE PRESENCE OF GOLD IN THE BLACK HILLS reported by Custer was confirmed by a scientific expedition sent there in the summer of 1875. It was headed by Professor Walter Jenney, a trained geologist, whose mission was to make a thorough topographical and geological survey of the area. "I have found gold in paying quantities in gravel bars on both Spring and Rapid Creeks and from 20 to 30 miles northeast of Harney Peak," Prof. Jenney reported. "The deposits are the richest yet found in the Hills and are very favorably situated."

Jenney was obviously as impressed as Custer with the lush grazing in the Hills areas as his reports were equally as enthusiastic about it. "It constitutes the great future wealth of this region and its value can hardly be over-estimated," the professor wrote. "There's gold enough to thoroughly settle and develop the country and after the placers are ended, stock raising will be the great business of the inhabitants who have a world of wealth in the splendid grazing of this region... No matter how valuable the mines may be, the great future wealth of the Black Hills will be its grasslands, farms and timber..."

The expedition's scout, California Joe Milner, put it another way: "There's gold from the grass roots down," he declared, "but there's more gold from the grass roots up."

These observations were prophetic. When the gold boom ended after a few short but wildly exciting years, the initial settlers scattered onto the virgin grasslands enveloping the Black Hills and took to farming and stock raising. Some of their descendants can still be found operating these pioneer farms and ranches. But before this agricultural legacy was created the Sioux claim to the Black Hills had to be extinguished. How it was done shaped a sorry chapter in the history of Indian-white relations.

FOLLOWING CUSTER'S DEFEAT AND DEATH at the Little Big Horn, Congress acted swiftly in retaliation. On August 15, 1876, less than two months after the shocking Indian



*Photos A1 and A2—A line of tents, smoke from campfires, grazing horses (upper left) and less forest cover distinguish this as a 109-year-old photo from a comparative photo (Photo A2) taken more than a century later about 3 miles east of the city of Custer. The modern photo shows the influence of man (buildings, highways) but of major importance is how forest cover has thickened.*

victory in Montana, Congress wrote a harsh amendment into the Sioux appropriations bill. It provided that no further funds would be spent on rations for the Indians as promised in the Laramie Treaty unless the Sioux gave up their cherished Black Hills. An "agreement" was drafted giving up the Black Hills to the whites and the Sioux chiefs were given the option of signing it or seeing their people starve. Most of them signed.

However, the agreement ignored a key provision of the Laramie Treaty which stipulated how further cession of Indian land could be achieved. It provided that no additional Indian lands would be ceded to the white man without the consent of three-fourths of the adult males of the affected tribes. While many of the chiefs had reluctantly signed the Black Hills Agreement, the number of signers did not come close to the requirement set forth in the 1868 treaty. But the country, outraged and humiliated by the destruction of Custer's command, was in no mood to observe technicalities. It looked the other way as white settlement of the Black Hills took place anyway and the Sioux were relegated to greatly reduced reservations outside of the gold region.

At first, the Black Hills gold boom was concentrated in the southern Hills where the initial discoveries had taken place. It shifted to the central Hills as the frenzied prospectors spread out from the discovery sites. Every report of fresh strikes, fancied or factual, sent the eager miners scurrying in new directions. When a major strike was made among the dead wood of Whitewood Creek in the northern Hills, the center of mining activity shifted there—and the wild and wooly mining camp of Deadwood was born. It was there that Wild Bill Hickock ignominously met his untimely death in 1876 and Calamity Jane became the real life heroine of countless western dime novels.

UP THE GULCH A COUPLE OF MILES from this storied mining center the Manuel brothers discovered the "Mother Lode" that was to become the fabulously productive Homestake Mining Company. It still ranks today as the largest and richest gold mine on the North American continent, and it's still producing!

With white settlement of the Black Hills a reality, despite the clouded title, the region soon lured an assorted array of characters whose chief goal was to mine the miners instead of the ore itself. It also provided a profitable market for a wide assortment of products essential to developing communities, including beef. The historic trail drives of Texas Longhorns to the northern grasslands that occurred after the Civil War had bypassed western Dakota because of the existence of the Great Sioux Reservation there, but with seizure of the region from the Indians completed, cattle were moved into it in immense numbers.

Paul Friggens, whose father had homesteaded a ranch in picturesque St. Onge Valley after obtaining a stake by working in the mines, tells about it in his 1983 book, *Gold and Grass: The Black Hills Story.* Friggens writes:

"The Black Hills and adjacent land offered some of the finest livestock grazing on earth; and here on these seemingly illimitable grasslands was free open range and a world of wealth waiting to lure cattle barons and settlers alike. With discovery of this bonanza, the hell-for-leather American cowboy was soon driving his bawling herds of Longhorns a thousand miles up the Texas Trail to graze this sea of grass; and with this impetus and demand, farming and ranching in the Black Hills region began."

The predictions of Custer, Prof. Jenney, and California Joe had come true!

SOUTH DAKOTA, TODAY a state of just under 700,000 population, is one of the most agricultural states in the nation. Its gross farm marketings in 1982 amounted to $2.9 billion, almost three-fourths of it from livestock sales. Its principal cities are Sioux Falls (pop. 81,343) in the southeastern corner of the state and Rapid City, now the metropolis of the Black Hills (pop. 46,492), where the SRM annual meeting will take place.

Its principal attractions are the Missouri River reservoirs, the fabled Badlands, and the scenic Black Hills where the world-famous Shrine of Democracy at Mount Rushmore and the Crazy Horse Mountain Memorial near Custer are located. Tourism is now the state's second largest industry. Except for the Homestake Mining Company at Lead, mining operations are no longer a major factor in the state's economy. Ellsworth Air Force Base, an important Strategic Air Command bomber and missile complex, is located nine miles east of Rapid City.

There are eight Indian reservations in the state, most of them in western South Dakota, all of which was once the Great Sioux Reservation. The Indian population represents about 4 percent of the state's total number of residents. On June 30, 1980, the U.S. Supreme Court ruled that the United States had illegally seized the 7.3 million-acre Black Hills from the Sioux Nation. It awarded the Indians $17.5 million, the estimated value of the region at the time of the seizure, plus $105 million in interest at five percent as compensation for the confiscated lands.

Despite abject poverty on the reservations, caused principally by lack of job opportunities there, the Sioux have so far refused to accept the huge money award. They insist, as most of their ancestors did in past years, that their beloved "Paha Sapa," as the Black Hills are known to them, are not for sale. They want the land returned!

It is in this setting that the Society of Range Management will be meeting in Rapid City next February.

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# Range Master of Agriculture Internships Lead Students to Rewarding Careers

**Wayne T. Hamilton**

Problem solving in agriculture and natural resource management is a complex process involving technical knowledge, a broadly based education and, equally important, experience. More than a decade ago, Texas A&M University developed a master of agriculture program, with a required internship, to prepare professional agriculture managers and leaders. In the Department of Range Science, the degree program can be directed toward emphasis in ranch management and several areas of rangeland resource management. Academic courses are selected from a wide range of interdisciplinary studies to give the student technical as well as management background. The internship of work in a related industry allows the student to gain experience and develop professional skills on the job.

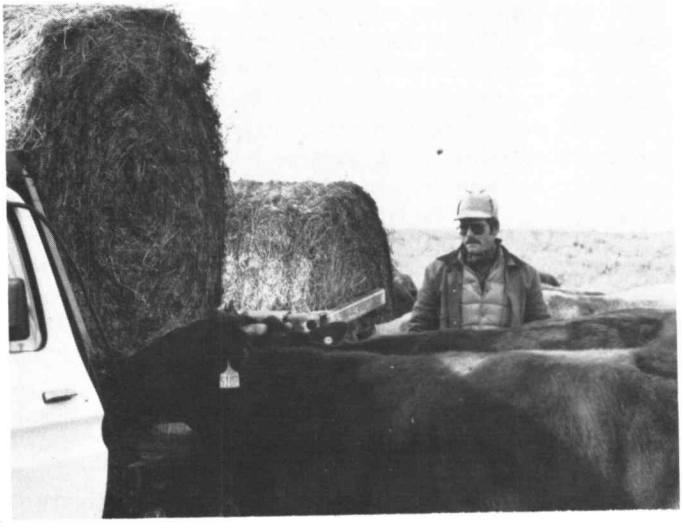
Degree requirements include 40 semester hours of graduate level credits, 12 hours of which must be taken outside the student's major field. Additionally, completion of a professional internship of at least 6 months duration is required in an area of industry related to the student's career interests. Students receive credit for the internship upon submission of a professional paper. A second paper is also required that deals with solving a specific problem related to their work.

Students in M.Agr. degree programs are supervised by an advisory committee composed of members of the graduate faculty. Advice frequently is obtained from employers prior to and during the internships concerning course selection for students. Employers also rate the student's performance during his or her work experience. Students are required to pass an oral examination after meeting all other requirements of the degree.

One of the most attractive features of the M.Agr. degree is that the program focuses on a management orientation rather than the traditional, research-related direction of an M.S. degree. Another attraction is that each degree program can be tailored to fit the student's specific career objectives. This includes a significant on-the-job management experience where students learn the feel of the "real" world. Supervision of the student's internship is by a practicing professional who can add a dimension of reality to decision making processes observed by and participated in by the intern.

A strong requirement for *experience* has been a consistent factor in job opportunities. The M.Agr. gives students an opportunity to gain experience and build managerial expertise. The amount of experience accrued during the internship is not sufficient, certainly, to build a professional employee, but it does provide a "track record" in the industry. It also shows that the student possesses basic skills and has become aware of current problems and opportunities in the business. The internship also can provide potential employers with a reference on the student from within the industry, and often results in important contacts not otherwise possible for the student.

The Department of Range Science at Texas A&M has graduated M.Agr. students with a variety of career interests. Perhaps the best way to describe the degree program and several of its advantages is by looking at some of the recent graduates and their internships, as well as their post-graduate employment.



*Tim Fitch, a 1979 range M.Agr. graduate, feeds hay to Beefmaster cows on the Martinez Ranch, which he manages, near McLean, Texas.*

Tim Fitch received a B.S. degree in range science in 1977, and immediately started a M.Agr. degree program. He completed the required on-campus course work for the degree in May 1978 and began a professional internship on the 35,000 acre Harrell Ranch near Claude, Texas. Tim's internship was completed in April, and he graduated in May 1979.

Tim is now the ranch manager of the 10,000 acre Martinez Beefmaster operation near McLean, Texas. His comments about his internship are similar to those of other students. "I learned a lot about things on the ranch by actually doing them. There is a difference between knowing what to do and how to do it. Some things require experience that you just don't get in the classroom."

An important concept of an internship paid off for Tim. "I had a chance to grow into responsibility rather than getting it dumped on me. The employer and his staff gave me jobs to

The author is Program Coordinator, Master of Agriculture, Department of Range Science, Texas A&M University, College Station.

do on my own, but they were there to answer questions when I needed help. This gave me time to learn before I went out where I was totally responsible for a job."

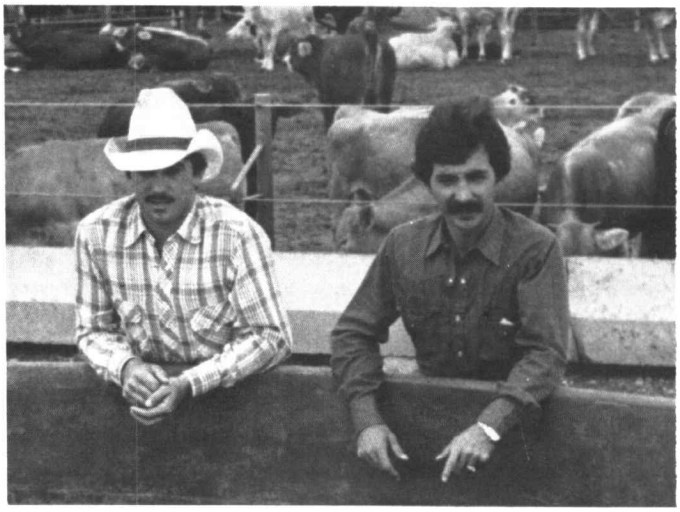
As do many other M.Agr. students, Tim believes that the extra 2 years beyond the bachelor's degree helped him to develop professionally. "I don't feel I would be as prepared to do the job I have now if it were not for my additional course work and the internship, although I had worked on ranches before. I matured a lot and understood more at the end of my M.Agr. program."

The Martinez Ranch has 2 cell-type, short duration grazing systems that were installed on about 2,200 acres after Tim began the job. The ranch also uses a microcomputer for inventory and accounting processes.

*Alan Koemel, a 1980 range M.Agr. graduate, observes range condition improvement on the Harrell Ranch near Claude, Texas. The Harrell Ranch has provided internships for two M.Agr. students.*

Alan Koemel completed his M.Agr. degree with an emphasis in ranch management in May of 1980, and also did his internship on the Harrell Ranch. Alan returned to work for the ranch after graduation and recently began managing his own ranch near Stephenville, Texas. He recalls that the internship helped him to "learn what will work in a given situation." Alan said "exposure to the employer, his staff and neighbors all helps to broaden the student's perspective of the ranching business. It helps to be able to do things for the first time or two while an experienced hand is looking on. They know you are a student and need to learn."

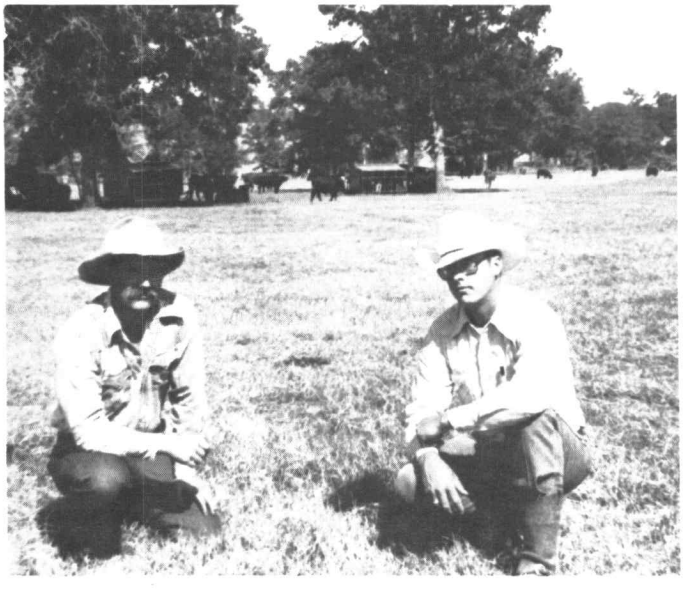
The M.Agr. degree in range science can be directed, with course work and the internship, toward a variety of range-related career choices. Francisco Elizondo used his M.Agr. degree to enter a multifaceted career. Francisco received a B.S. degree in agricultural economics from Monterrey Tech in 1976, and his M.Agr. in range science from Texas A&M in 1979. He chose to emphasize range nutrition and economics at the graduate level, and took additional courses in feedlot management after completing his degree requirements. Francisco split his internship between a purebed Charolais operation, a major feedlot in the Monterrey, Mexico, area and a commercial cattle ranch. He now has a consulting business in Monterrey where he works primarily with livestock producers on pasture supplement and feedlot programs. Francisco uses computer record keeping systems for his clients, and works with least-cost rations and projected vs. actual performance evaluations. He also provides services in feedlot design.



*Francisco Elizondo (R) is pictured with one of his feedlot clients in Mexico. Francisco is a 1979 range M.Agr. graduate now operating a consulting firm in Monterrey, Mexico.*

Prior to entering consulting as a primary business venture, Francisco taught in the Department of Agri-business at Monterrey Tech. He is also active in the management of a family-owned ranch near Monterrey. Francisco believes that his internship helped to broaden his understanding of a wide range of agricultural problems. As he puts it, "the split internship gave me an opportunity to experience and learn something about 3 phases of the livestock industry, and I'm using all of it in my business. I believe the M.Agr. degree allowed me more opportunity to take courses in different areas of interest than would have been possible in a traditional degree."

Gerald Proctor's father was a ranch manager and Gerald grew up knowing that this was what he wanted to do. He completed an undergraduate degree in range science in 1979, and a M.Agr. in May 1981. Gerald arranged his professional intership with Granada Land and Cattle Company near Bryan, Texas. Granada is a large, diversified company using a service concept and a nucleus of expertise and tech-



*Gerald Proctor (R), a M.Agr. graduate employed by Granada Land and Cattle Co. of Texas, is shown with Ken Freeman while Ken was on his internship at Granada.*

nology. It specializes in livestock production ranging from embryo transfer to feedlot management. Intensive pasture programs in the central Texas area carry thousands of cattle annually, making Granada a unique opportunity for students to become involved in large volume cattle management.

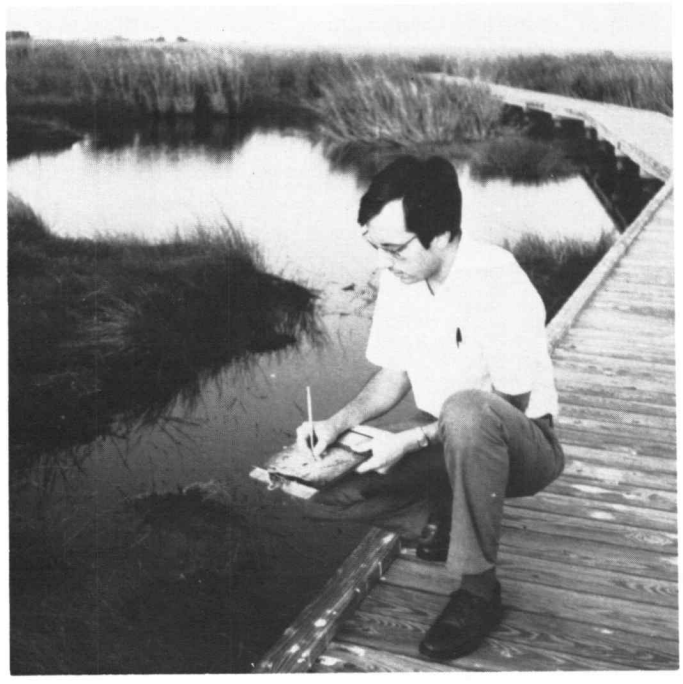
Gerald was employed by Granada following completion of his M.Agr. degree, and is now manager of the 3,900 acre Cedar Creek Ranch near Wheelock, Texas. He makes the following point about his internship and employment with the same company. "It is nice when you can go right to work for the same outfit after graduation, but that should not be the idea of an internship program. The internship is a means to gain experience and learn more about both fundamentals and new techniques being used in the business. It should help prepare the students for an *area* of employment for which he is better qualified."

Master of agriculture graduates such as Tim, Alan, Francisco, and Gerald, who are now working in the field, are providing valuable insights as to how the program can be better designed. These evaluations are given attention by the department. For example, all of these ex-interns felt that they would have benefited by additional course work in business and "people" management Gerald Proctor also suggested that more emphasis be put on employer "debriefing" to point out areas that need attention in development of the academic programs on campus. "Early identification of the internship provides a chance for the employer to have input into course selection," said Proctor.

Ken Freeman began a M.Agr. degree at Texas A&M in September of 1980 after receiving an animal science undergraduate degree at Tarleton State University. Like Gerald Proctor, Ken had a lot of "hands-on" ranch experience in his background, but still found the internship an essential element of his professional development. Ken also did his internship at Granada and was under the supervision of several property managers during his program. As Ken states: "I worked with some ranch managers who really helped me. They do things differently here (Granada) than back on the home place, so the internship is important even if you have ranch background. I was given a lot of record keeping responsibilities and learned new techniques. I built a professional attitude and outlook during my internship, and I think this is an important part of a graduate program." Ken is now managing a ranch near Hope, Arkansas.

M.Agr. graduates are not limited to the ranch management emphasis in degree programs. Barbara Stockard, a May 1980 M.Agr. graduate, planned her degree toward a career in environmental management. Her internship was with a Dallas-based environmental consulting firm that worked with impact assessments for lignite-fired power plants. Barbara's work experience included responsibility for portions of environmental assessments involving soils and vegetation. She located the internship early in her program and received valuable advice on course work recommendations from company personnel.

After working briefly with air quality permitting at another consulting firm, Barbara joined the Environmental Protection Agency as an environmental scientist in air and waste management. Barbara believes her internship was the key to "a good start in the environmental field" and that "the Master's degree is important." She says "the M.Agr. degree gave me a wide background and allowed a more open aspect in employment potential. I believe it was helpful to be able to face a wider range of problems. The internship was particularly good to attune me to the *unexpected* things that do happen and for which experience is often the only solution. It helped my confidence." Like other students, Barbara looks back to areas where more study would have helped, such as computers and technical writing, but feels that the M.Agr. degree was a good approach to her career.



*Gerald Rapp, a 1982 range M.Agr. graduate, surveys vegetation in Sea Rim State Park, Texas. Gerald used the M.Agr. degree to broaden his natural resources management capabilities as a city planner.*

A unique use of a M.Agr. degree involved a student with a B.S. in sociology and a master's degree in urban planning. Gerald Rapp had been employed since 1974 by the City of Port Arthur, Texas, as assistant director of planning before he entered a M.Agr. program in the Department of Range Science in 1981. He recognized needs in city planning related to natural resources management. Rapp chose the M.Agr. degree in natural resource development after careful review of options because of the flexibility it offered to tailor a degree program to meet his specific objectives. Gerald felt that a knowledge of natural resource management was necessary for him to communicate effectively with consultants engaged by the city to do resource related studies, such as vegetation analyses.

Gerald's degree program included range courses as well as several in water, soils and other areas. According to Gerald, "range gave me the entrée to ecosystem management I needed. Before, I was mostly managing by crisis in dealing with natural resources. I can now be more planning oriented. I can conceptualize biological responses that will occur over time such as the use of low inputs to cause desired changes through secondary succession. This is planning, and it is a much more productive role for me professionally. I am also much better qualified to attend symposia and other meetings dealing with natural resource management and to interpret effectively information pertaining to our needs."

Gerald's experience in his profession was adequate to

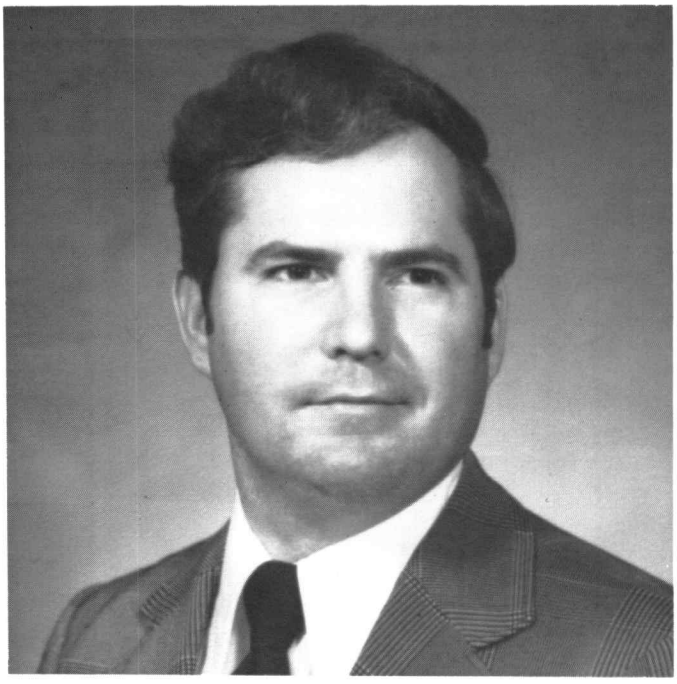
allow waiving of the internship requirement in his degree program, only the second time this has been done in the Department of Range Science. He submitted a paper, however, dealing with the solution of a natural resource management problem in the Sabine Pass area wetlands that pertained to his work with the City of Port Arthur. Gerald believes he actually did an "internship in reverse." He used papers prepared in his graduate studies to help solve real problems he was dealing with on his job.

*Jan Read, a 1982 range M.Agr. graduate, did her internship in Burley, Idaho, with the Bureau of Land Management. Jan is shown working in the USDA-ARS lab where she earned funds to support her on campus.*

Jan Read, an August 1982 M.Agr. graduate, did her internship with the Bureau of Land Management at Burley, Idaho. Jan thinks that the internship helped her define her career interests more completely. "I was sure I wanted to be in some area of range management, and I wanted to have contact with producers. I felt that I would like to be involved in the actual application of management principles. The internship with BLM provided an excellent opportunity to do this type of work. I have a much better feeling now about my ability to apply range management practices whether with an agency or on a private ranch."

Jan's undergraduate degree was in animal science, and she decided on a master's program in range to give her a better balance "between the animals and the resource." Her internship came before she had finished her course work for the degree, which Jan considers an advantage. She says, "I was able to use my work experience to expose areas where I needed courses, and my advisory committee agreed with several changes in my program." Jan was recently employed by a ranch in southeast Texas.

The M.Agr. degree in range science also suited the interests of Bob Trott; in fact, he completed two M.Agr. programs at Texas A&M. After an undergraduate B.B.A. in finance in 1968, Bob served 5 years as an Air Force pilot. He returned to Texas A&M in 1973 and worked simultaneously on degrees in agricultural economics and range science. His internship programs included 3 months with a bank in Bryan, Texas, followed by 9 months on the O'Connor Brothers Ranch near Refugio. Bob graduated in 1977 and was employed by Victoria Bank and Trust. He is currently vice president for commercial loans and deals primarily with production agricultural loans, about 40% of which are on ranch properties.



*Bob Trott used M.Agr. degrees in both range science and agricultural economics to enter a career in ag-finance. Bob is currently vice president for commercial loans at Victoria Bank and Trust in Victoria, Texas.*

Bob had the following comments about his internship program: "It's a chance to get your hands dirty—that is, to see the application of theory in the "real" world. I gained perspective and a better appreciation from the internships of what it takes to be successful in a professional career."

The M.Agr. degree helped Larry Miles to enter an extension service career. After receiving a B.S. degree in range science in 1978, Larry decided to look seriously at extension work. He built his degree program to fit this objective after consultations with extension and agricultural education staff members on the Texas A&M campus. He was able to enter the Extension Service as a County Extension Agent prior to graduation, and use the first 6 months of his employment as the internship period. Larry completed the M.Agr. degree in December 1980. He said, "I found I had a solid foundation in areas other than range although both of my degrees are in range. My undergraduate degree included a lot of hours in animal science and agricultural economics, which I use consistently in my work. I used the M.Agr. degree to further develop these and other areas, and to get the education courses I needed for extension work. I have found that my undergraduate range degree gave me a broad base upon which to build at the master's level."

Current students in the program include those with career interests in federal agencies, ranch management, and rangeland rehabilitation. These students arrange their own internships and usually provide their own financial support while on campus. Students who are on their internships receive wages and benefits that are negotiated with employers on an individual basis. Employers consider that the interns are contributing to their operations, and the interns must consider that the empolyer is contributing to their educational

opportunity. Scott Hennigar, who will begin his internship on a ranch in south Texas in May 1983, may have summed up the attitude many students have about the M.Agr. degree: "I think of my internship as an opportunity to work with a professional who has been successful for years doing what I want to do. If you want a management career, I don't know a better way to go about it."

Everyone involved with the Department of Range Science M.Agr. program agrees that a key element of its success is the willingness of cooperating employers to participate in the development of students through internship opportunities. The result is mutually beneficial to the students, to the internship employer, and to the industry or profession that the student joins. Our students have been fortunate to locate productive internships which fulfill the field training and experience requirements associated with the degree. We thank those in the range-livestock and related industries who are making the program a success. It would not work without their participation.

# Rancher Fences Creek to Slow Erosion

**Brad Anseth**

Joe Jepson, a young Townsend rancher in southwest Montana, has fenced both sides of a creek that winds through his property. This is part of a long range plan to improve the soil and water resources on his 480-acre ranch that he bought 3 years ago.

Originally he planned to fence only along one side of the creek, mainly to get better livestock distribution on his irrigated pasture. But in 1981 the creek went wild and caused him to think about more fencing.

The 1981 Memorial Day storm accelerated the erosion and slumping along Deep Creek, the creek running through his ranch. The high waters almost destroyed his irrigation pump site. This caused him to want to do whatever it took to keep the creek in its banks. The fence seemed a good idea. He thinks this will encourage the brush to spread out and send down more roots to stabilize the banks. Just keeping the cattle off the saturated banks should eliminate some sloughing.

The creek is the prime livestock water source for to pastures. Jepson is fencing a 30-foot corridor across the creek for livestock water and to serve as a moving lane. He plans to grade and riprap this section.

Jepson's concern for reducing erosion on the creek is part of a larger plan he has for the ranch. He thinks the entire ranch needs attention.

He has signed a Great Plains contract with the U.S. Soil Conservation Service for fencing as well as other soil and water conservation work. Under the contract he will receive technical help and cost-share funds. In the end he will have three dryland and two irrigated pastures instead of just one large pasture as it was.

The fences will help Joe toward his goal of getting situated to run 100-200 head of yearlings. As a part of that goal, he has also seeded 100 acres of dryland grainland to alfalfa and pubescent wheatgrass, rested his rangeland for 2 years, and plans to develop a well to bring stockwater to 3 of the 5 fields.

Once the improvements are in place, Jepson plans to develop and use a grazing system on the ranch. He knows it will take time to improve the soil and water resources, but he has already seen the improvement and plans to continue his work.

*Deep Creek, north of Townsend, has a history of erosion. Jepson fenced along the creek's corridor to keep his cattle out and allow the brush and grass to spread. The vegetation will help stop the stream from cutting and eroding the banks.*

*Joe Jepson (left) fenced both sides of Deep Creek in an effort to allow the vegetation to grow and stabilize the eroding stream banks. Jepson and Mike Crowell (SCS) stand in the fenced stream corridor.*

The author is with the Soil Conservation Service, Bozeman, Mont.

*Editor's Note:* This article is an example showing that small ranchers too, are interested in soil conservation and range management.

# Australia's Foreign Assistance Programs Contributing to Rangeland Production

**V.R. Squires**

*Editor's Note:* This interesting article tells something about the Foreign Assistance programs of Australia.

Australia has developed in less than 200 years from a land without agriculture to a leading world producer of food, natural fibres, and livestock, an achievement made against severe climatic and environmental difficulties. Few of the world's greatest agricultural countries had a less promising start than Australia—in the beginning its only real assets were virtually unlimited land and a few hardy and resourceful people to work it. Today Australia is the world's largest exporter of wool, the largest exporter by quantity and the second largest by value of meat, and the third largest exporter of wheat.

Numerous countries are now building stable, productive, and profitable systems with the help of Australia's agricultural industries, which offer a wide range of expert services. Australian farming equipment, technology, and expertise are exported to many countries including many developing countries in Asia, Africa, and South America which have similar terrains and climates to those in Australia.

Australia is already contributing to agricultural technology in arid areas of developing countries such as Nigeria, Libya, Algeria, Sudan, Iran, Egypt, Ethiopia, Somalia, Yemen Arab Republic, Iraq, India, and China and to the tropical regions of south east Asia. Australian consultants are applying their expertise and experience in rangeland assessment, regeneration studies, drought strategy development, grazing systems, water catchment management, aquifer development, water drilling, animal breeding, animal behaviour, pre-investment studies, and infra-structure requirements.

## Foreign Aid

Australia's development assistance program is directed towards promoting the economic and social advancement of developing countries, particularly in Asia and the Pacific. It aims to meet the expressed needs of these countries and is directed towards key activities in their economies. All of Australia's aid is given on grant terms and a significant proportion is untied. About 80 countries receive assistance but Australia's aid is principally directed at assisting its nearest neighbours—Papua New Guinea, the South Pacific Region, and southeast Asian nations (ASEAN). In 1981-82 Australia spent $662 million on official development assistance, more than $100 million above the 1980-81 amount.

The author is Dean of the Faculty of Natural Resources, Roseworthy Agricultural College, Roseworthy, South Australia 5371.

Thanks are due to Mr. L. Kuipers, Australian Development Assistance Burean, Adelaide for furnishing information about the ADAB's program.

Aid is in 3 broad categories: (a) bilateral, (b) multilateral, and (c) nongovernment.

*Bilateral Aid Programs*

Australia's total bilateral aid is about $520 million and of this sum about 40% is devoted to education and training. It is difficult to separate out, in any meaningful fashion, the distinction between the aid which is primarily agricultural (as in crops) and that which is aimed at rangeland production. In some regions the aid involves transfer of technology which aims to replace existing degraded vegetation types with sown pastures. Papua-New Guinea is the biggest single recipient of Australian aid.

Most of Australia's bilateral aid to countries other than Papua New Guinea is for specific development activities undertaken by the developing countries. These range from large scale regional development programs to simple facilities in villages. As of July 1, 1982, Australia was involved in 323 projects in 35 countries. Most of the projects involve infra-structure development work, agricultural improvements through crop and livestock research, as well as practical extension work. In recent years Australia has become increasingly involved in large-scale integrated rural development programs designed to bring about balanced growth in whole regions.

*Multilateral Aid*

Australia contributes to several international organizations and financial institutions concerned with aid to developing countries. They include the World Bank Group, Asian Development Bank, United Nations Development Program (UNDP), and other UN agencies, International Fund for Technical co-operation, Economic and Social Commission for Asia and the South Pacific, South Pacific Bureau for Economic Co-operation, South Pacific Commission and various other international science, technology, and research centres. Support for these bodies provides Australia with an opportunity to participate in major development projects which are beyond the resources of individual donors. Contributions to multi-national aid in 1981-82 were in the order of $140 million.

A recent initiative in Australia has been to set up the Australian Centre for International Agricultural Research (ACIAR). The centre will contract research to existing institutions in agriculture and related disciplines for the benefit of developing countries. When appropriate, research work will be carried out in developing countries and opportunities sought to involve research and extension workers from these countries.

*Nongovernment Aid*

Nongovernment organizations also make an important contribution. The principal ones are the long-running Aus-

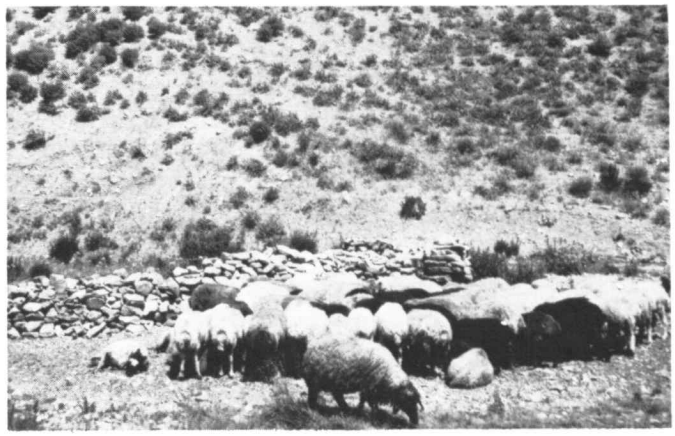
tralian Volunteers Abroad, the Australian Executive Service Overseas Program, and of course the private consultant firms.

Australian expertise has found its way into the market place on the international consulting front. This has been either through engaging individuals for work in agencies such as FAO or UNDP or more recently through successful bidding by Australian firms for development contracts.

Several important private companies operate out of Australia. They have projects in South America, South east Asia, and in North Africa and the Middle East. More recently the trend has been for Overseas Projects Divisions to be set up within the various Departments of Agriculture within Australia. The Government of Western Australia has had successful projects on dryland farming and rangeland integration in Libya, Tunisia, and Iraq. The South Australian Government has projects in Algeria, Iraq, Jordan and is about to begin work in Tunisia. The *modus operandi* is that these international Divisions within the Agriculture Departments of the various Australia States are manned by a small co-ordinating staff. They then second officers of the Department to overseas projects and/or recruit staff for fixed contracts from universities and elsewhere.

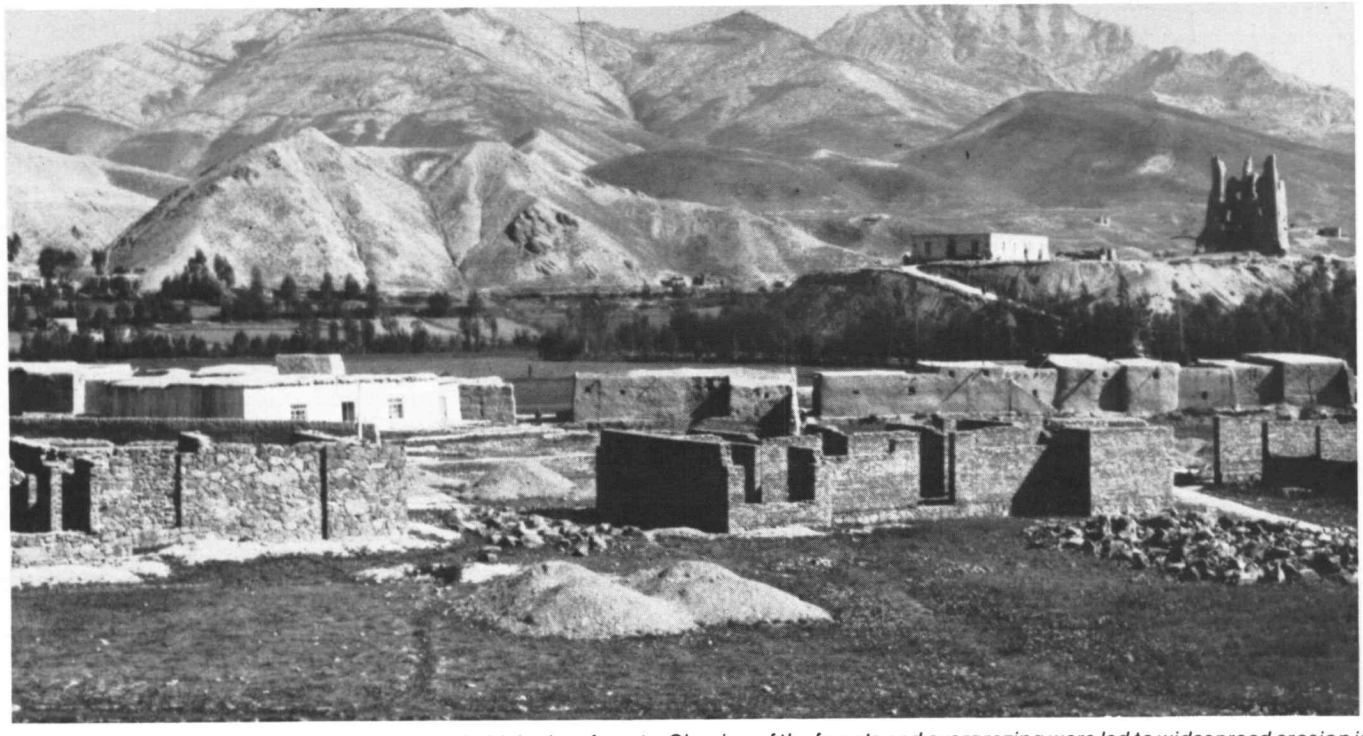
My own involvement in foreign aid projects has been limited to 2 main employers. In the first instance I worked as a consultant range ecologist in Iran with a private company which was Australian. The team was a multi-disciplinary one with engineers, ecologists, sociologists, horticulturalists, soil erosion specialists, and economists. The task was to develop a management plan for an 80,000-ha catchment in the 3,000 metre high Alborz mountains of Iran.

My second major involvement has been on a South Australian government project in the Algerian Steppe. I was short-term consultant rangeland ecologist on an 850,000-ha project which involved hydrologists, engineers, sociologists, economists, soil surveyors, irrigation agronomists, and others. Here, and in the Iranian example cited above, the object was to transfer technology to a specific region. We had a specific job within a specific time frame at a contract price. The source of money for the projects was from the World Bank which was assisting the countries mentioned in their development programs.



*Fat-tailed sheep in the Alborz Mountains in northern Iran. Heavy grazing pressure in these mountain rangelands (elevation about 10,000 feet) has destroyed grass and edible shrubs. Spiny and/or poisonous shrubs and sub-shrubs now dominate. Aid and technical advice offered by Australia is aimed on a broad front and includes aspects such as livestock improvement and range rehabilitation.*

Throughout the developing world there is a major scope for increasing forage resources and livestock production, but there are also major limitations to development. Aid agencies such as the World Bank and FAO have identified the desperate need to augment as quickly as possible the national manpower pool of persons professionally trained in agriculture and related sciences, including rangeland management. The shortage of trained manpower creates deficiencies that pervade the entire spectrum of effort to



*These Iranian mountains were once covered with juniper forests. Clearing of the forests and overgrazing were led to widespread erosion in these steep, mountain rangelands. There is no vegetation to prevent snow melt waters from carrying enormous amounts of soil into rivers and streams. Technical advice on re-forestation, erosion control, and range restoration is part of the total foreign assistance package.*

promote national development.

*Training Programs*

The Australian Government Aid programs recognise these constraints and a major share of the total aid packages goes to educational programs in all its forms, for both the development of educational facilities in the recipient countries and in providing training. Before attempting to look at training in the area of rangeland management it is instructive to examine Australia's record over the whole field of training of overseas personnel. There have been some shifts, e.g., the ratio of graduate to undergraduate trainees over the decades from 3:1 to something closer to unity. This partly reflects a trend away from foreigners training in Australia at the undergraduate level and partly the fact that Australian universities now have admission on a quota system.

Over 4,300 awards were made in 1980 to foreign students but only 474 were in agriculture or related disciplines. This proportion (12%) is much lower than the 22% of foreign aid which goes to agriculture. Considering too that further aid is channelled through multi-lateral agencies it is suggested that the proportion of trainees in agriculture and animal production disciplines is low in comparison with other inputs into other forms of aid.

Notwithstanding this, Australia has played a significant role in training overseas students in the area of extensive livestock production. Similarities of climate and land use problems with many developing countries make training in Australia quite relevant. Added to this is the international reputation in tropical pasture research, tropical animal husbandry, and arid zone research.

Training is offered at a number of levels. The largest numbers of trainees are at the tertiary level. Many candidates take our one-year Graduate Diploma course which was designed very much with the foreign student in mind. Candidates for these awards have come from 26 foreign countries. The second level of training is for practical technicians. It is, I believe, a most important area but one which is often neglected. Many countries have graduates who have no idea how to transfer a project plan to a practical reality on the ground. A great need is for field operatives, stockmen, and range technicians who can build a fence, hang a gate, construct a dip, brand a beast, vaccinate, castrate cattle and so on. There are short courses which contribute to this area of training. These courses involve lectures, practical work, field tours, and periods of secondment[1] working with ranchers and others. Groups of trainees from as far afield as Uganda, Uruaguy, Dominican Republic, and Brazil have been trained in separate courses.

Graduates from courses undertaken in Australia by foreign nationals have often had a major impact on livestock and range development programs on their return home. A more recent development has been the operation of training courses in foreign countries. It is recognised that such courses can have great impact. Problems of immediate relevance can by analysed and the training made more meaninngful.

The Australian universities are involved in such overseas training programs which involve 4-man teams for 1 month's teaching. Each short course has a 3 year follow-up research program where course participants develop an on-going research project with the supervision and co-operation of the Australia teaching staff. This is a most important aspect providing a longer term involvement and a continuity of development from the course. Apart from short courses the universities also provide for secondment of Australian staff for short term and long term teaching assignments; for assistance in English training; and with library facilities, teaching and laboratory equipment; and so on. This scheme works on an extremely limited budget but is highly successful both in terms of return to the dollar invested and achievements in development of successful training programs. This has been made possible by the voluntary involvement of university staff members throughout Australia (and some non-university specialists in Federal or State government employ) without salary cost to the scheme.

**Summary and Conclusions**

The livestock cropping systems evolved in Australia have made the most of limited natural resources and have put Australia at the forefront of the world's agricultural national. Many of the systems developed in Australia are in response to poor soils, low rainfall, vast distances, low populations, and market-demand. This has called for perserverance and ingenuity.

Many of the systems are applicable to other parts of the world and this is demonstrated by the export of Australian ideas and technology all over the world.

The Asian and Pacific regions have traditionally been the major recipients of project assistance. The recognition that African countries and the Indian Ocean states contain many of the poorest on earth has prompted an increase in the amount of aid which is directed there. Apart from the normal project activities the expanded program will include staffing assistance programs, provision of development import grants, and provision of assistance to regional programs.

# Call for Inventorying Papers

An international conference entitled "Inventorying Forest and Other Vegetation of the High Latitude and High Altitude Regions" will be held July 23-26, 1984, in Fairbanks, Alaska. This conference is sponsored by the Society of American Foresters and the International Union of Forestry Research organizations.

Contributed papers on the major workshop topics are solicited. Those interested in submitting papers should submit a title, 200-word abstract (maximum), author's name, address, affiliation, and phone number to: Dr. H.W. Gabrial, Bureau of Land Management, 701 C Street, Box 13, Anchorage, Alaska 99513.

Abstracts must be received by December 1, 1983. Authors will be notified by February 1, 1984, regarding acceptance of papers.

# Considerations Concerning Grazing Systems

**Jerry L. Holechek**

*Editor's Note:* Parts of this article have been published before but we think we should publish again because the seven major grazing systems in use today are described and discussed. Should serve as a good reference article.

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During the last 5 years grazing systems have been a major focus of range researchers and managers. Although several papers have evaluated available research on the different systems, an analysis of the conditions where the individual systems should give best results is still lacking. Grazing systems commonly used in the United States include continuous, deferred rotation, rest rotation, short duration, Merrill three-herd/four-pasture, high intensity-low frequency, and seasonal suitability systems. It is my intent to discuss the conditions where each of these systems should provide the best results with special consideration given to riparian zones.

### Continuous Grazing

Continuous grazing involves grazing a particular pasture throughout the grazing season year after year. Grazing systems other than continuous are commonly called specialized systems because scheduled moves of livestock from one pasture to another are involved.

The primary problem associated with continous grazing is that livestock have preferred plants and areas for grazing. These plants and areas receive excessive use even under light stocking rates. The preferred areas generally occur where water, forage, and cover are in close proximity. These are often the most productive parts of the pasture.

Continuous grazing at a stocking rate that gives moderate use (50% removal of current year's growth) has given good results in the flat shortgrass prairie country of the Great Plains where watering points are usually not farther than 2 miles apart and differences in palatability between forage species is minimal. The shortgrasses, blue grama and buffalo grass, are the primary forage species. They evolved with heavy grazing by bison and are quite grazing resistant. Precipitation in the shortgrass country occurs as several light rains throughout the summer months. Therefore considerable opportunity exists for regrowth after defoliation. The flat nature of the terrain and the close proximity of watering areas minimizes the tendency of livestock to congregate and linger in the most convenient areas. Sacrifice areas can be reclaimed by temporary fencing to allow vegetation recovery. Since most of the sacrifice areas occur around water, control of access to watering points can be used to provide sacrifice areas with periodic nonuse.

Continuous grazing has given superior results to specialized systems in the California annual grassland type when use was moderate and practices such as salting, fencing, and water development were used to obtain proper distribution. Annual grasses need only to set seed year after year to maintain themselves, unlike perennial grasses that must store carbohydrates. Differences in palatability between most of the annual grasses are small.

In both the shortgrass and California annual grassland types, livestock performance has been better under continuous grazing than specialized systems. This is explained by the fact continuous grazing allows livestock to exhibit maximum forage selectivity and minimizes livestock disturbance due to gathering, trailing, and quick change in forage quality.

### Deferred Rotation Grazing

Deferment involves delay of grazing until seed maturity of the important forage species is completed. Rotation is the movement of livestock from one pasture to another on a scheduled basis. Initial research on this system was conducted by Arthur Sampson in the Blue Mountains of northeastern Oregon in the early 1900's. The system he studied involved dividing the range into two pastures. Each pasture received deferred grazing every other year. Vegetation response under this system has been superior to continuous

*Deferred rotation grazing has improved the condition of mountain ranges in the northwestern United States without reducing livestock performance when compared to season-long grazing.*

The author is associate professor of range ecology, Department of Animal and Range Sciences, New Mexico State University, Las Cruces 88003.

grazing on bunchgrass and mountain ranges in the northwestern United States and on tall grass ranges in the eastern Great Plains. Deferred rotation grazing provides a better opportunity for preferred plants and areas to maintain and gain vigor than continous grazing. It works best where considerable difference exists between palatability of plants and convenience of areas for grazing. On mountain ranges, stringer meadows and riparian zones will often receive excessive use by cattle even under extra light grazing intensities while surrounding uplands will receive light or no use. The deferred rotation system provides forage species on the lowland sacrifice areas with the opportunity to store carbohydrates and set seed every other year. Recent research from the Starkey Experimental Range and Forest in northeastern Oregon confirms deferred rotation grazing is superior to continuous grazing from the standpoint of vegetation and equal to continuous grazing in terms of livestock performance on mountain range. Deer and elk at the Starkey Range are benefited by deferred rotation grazing because the ungrazed pastures permit greater forage selectivity and provide an area free from livestock disturbance. These big game animals prefer to avoid livestock if possible.

### Rest Rotation Grazing

Rest rotation grazing was developed by Gus Hormay of the Forest Service in the 1950's and 1960's. This system is unique in that one pasture receives 12 months of nonuse while the other pastures absorb the grazing load. Presently most rest rotation schemes involve 4 pastures. Various sorts of rotation schemes are used on the 3 grazed pastures. The problem with rest rotation grazing is that the benefits from rest may be nullified by the extra use that occurs on the grazed pastures.

Rest rotation grazing appears superior to continuous grazing on mountain ranges where livestock distribution problems occur. On semidesert grassland range in southern Arizona, S. Clark Martin has reported good results with a 3-pasture rest rotation system. Under the Santa Rita system, as it is called, stocking rates on grazed pastures are kept at moderate levels. Old herbage from the rest pasture protects early spring growth from repeated close grazing. Benefits from this system are greatest where animals congregate such as around watering areas.

Rest rotation grazing has been criticized for reducing livestock performance because of reduced grazing selectivity and forced animal movement from pasture to pasture. On the Starkey Experimental Range in northeastern Oregon, research Martin Vavra and I have conducted has shown little difference in cattle performance and diet quality between rest rotation, deferred rotation, and season long grazing systems. Stocking rates were the same under all 3 systems and resulted in moderate forage use.

From a multiple use standpoint, rest rotation grazing with moderate stocking of grazed pastures has a number of advantages. Small mammals and upland game birds are provided with a good vegetative cover throughout the year on at least part of the area. In eastern Montana waterfowl production was increased three fold when rest rotation was compared to continuous grazing. The rest pasture provided waterfowl with the heavy cover they need for good nesting success. Big game animals, such as deer and elk, that generally prefer to avoid livestock are provided with an area free from disturbance and have maximum forage selectivity in the ungrazed pasture. From an aesthetic standpoint the public prefers to see a certain amount of the range ungrazed. The major drawback with rest rotation grazing is that livestock numbers may have to be reduced to prevent excessive use on the grazed pastures. In areas with large big game populations, the rest pasture may receive heavy use by big game.

### The Merrill Three-Herd/Four-Pasture System

In the early 1950's Leo B. Merrill in south central Texas developed a grazing system involving three herds and four pastures. With this system each pasture is grazed continuously for a year, and then given a four-month period of nonuse. The period of nonuse in each pasture has occurred during all times of the year at the end of a four-year cycle.

*The Merrill three-herd/four-pasture system has proven superior to continuous grazing in terms of vegetation, livestock performance, and wildlife on Texas rangelands where effective precipitation can occur at any time during the year.*

This system has given good results where effective precipitation and plant growth can occur at any time during the year. It also works well where common use of the range by more than one grazing animal is practiced. In Texas some combination of cattle, sheep, goats, and white-tailed deer graze most ranches. Each grazed pasture is assigned a different type of livestock. Every four months the types of livestock are interchanged between pastures. White-tailed deer prefer the pasture receiving nonuse by livestock. The Merrill system has been the best studied of all the specialized grazing systems. In Texas it is superior to continuous grazing from the standpoint of livestock, forage, and wildlife production. This system should be effective in areas where forage plants have the potential for growth throughout the year and common use grazing is practiced.

### Short Duration Grazing

Short duration grazing was developed in Rhodesia and is described by Sid Goodloe (JRM, 1969, 22:369). A modification of short duration grazing called the Savory Grazing Method is discussed by Allan Savory and Stanley D. Parsons (Rangelands, 1980, 2:34). This system typically involves a wagon wheel arrangement of fences with water and livestock handling facilities located in the center of the grazing area. It is recommended that no fewer than eight pastures (pad-

docks) of equal grazing be built that radiate as spokes from the central area where the water is located. Each paddock is given a short, intensive period of grazing followed by a long period of nonuse. Ideally the grazing period of each paddock should be five days or less followed by seven weeks of nonuse. The high stock density is supposed to improve water infiltration into the soil as the result of hoof action, reduce selectivity so that more plants are grazed, improve the leaf area index, and give more even use of the range. It is claimed that these benefits permit stocking rates to be substantially increased compared to continuous grazing. Presently lack of research prevents drawing definite conclusions about the effectiveness of short duration grazing.

From a theoretical standpoint rapid rotation grazing should work best in flat grassland areas which have an extended period of plant growth (at least three months), small differences in plant species palatability, and at least twelve inches of average annual precipitation. These conditions apply to most of the prairie region east of the Rocky Mountains. In the drier, more rugged parts of the western United States, fencing and water distribution problems make rapid rotation grazing less feasible. Concentrating livestock in the early part of the grazing season has the potential for severe trampling of plants and soil compaction on mountain and sagebrush ranges where much of the effective precipitation comes from snow melt and heavy, early spring rains. These areas typically have growing seasons that are under three months. If plants are heavily defoliated, there is little opportunity for regrowth. Differences in plant palatability are great and livestock will starve before they will accept many of the shrubs such as big sagebrush or rabbitbrush.

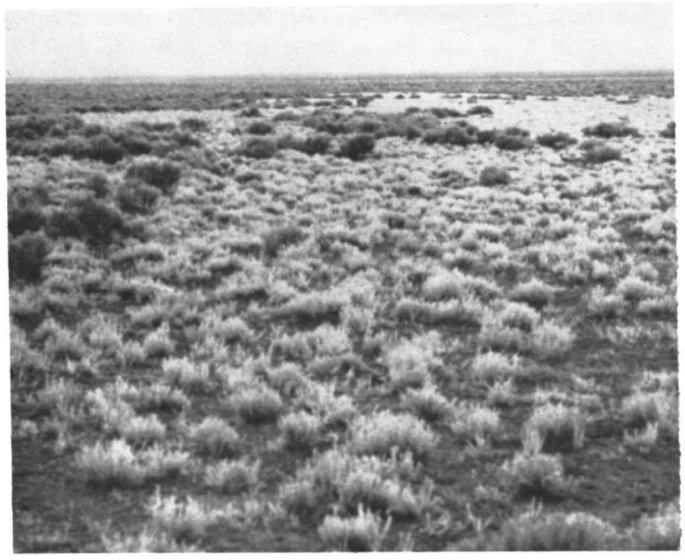
There are many potential problems with short duration grazing on desert ranges in the Southwest. The biggest of these problems is that a tremendous amount of fence must be built per paddock to accommodate a reasonable number of livestock (100 head of cows) due to the sparse nature of the vegetation (good condition desert grassland ranges typically produce 300-400 pounds of forage per acre compared to about 800 pounds per acre for shortgrass prairie). In most years growth of the perennial grasses occurs in less than a 60-day period, which minimizes the positive aspects of repeated light defoliation. Precipitation that does occur is often from one or two intense thunderstorms. Concentration of animals, therefore, has the potential for severe soil compaction. Another problem is that most of the desert grasses are very low in grazing resistance unlike the prairie grasses that evolved with bison grazing. One failure to move cattle at the correct time under the rapid rotation system could severely damage grasses such as black grama or Arizona cottontop. Lowlands dominated by tobasa grass and big sacaton are productive because they collect water runoff from uplands and have deper soils. On these ranges short duration grazing may be practical.

### High Intensity-Low Frequency Grazing

High intensity-low frequency (HILF) grazing differs from rapid rotation grazing in that periods of grazing are typically longer than two weeks and nonuse periods are over 60 days. This system requires at least three pastures per herd of livestock. Stocking rates must be light to moderate under this system or severe declines in livestock production and excessive defoliation will occur. This system, like short duration grazing, works best in flat terrain with an extended growing season and forage species of similar palatability. An important objective of the HILF grazing system is to force use of old, coarse, unpalatable but grazable forage. Because this system has negative impacts on animal nutrition and forces heavy plant defoliation, it has been largely abandoned in favor of short duration grazing, which allows greater animal selectivity, permits lighter levels of defoliation, and prevents more of the forage from maturing prior to grazing.

### Seasonal Suitability Grazing

Seasonal suitability grazing involves partitioning a range into pastures based on vegetation types or conditions classes. The best pasture from a nutritional standpoint is used for each season of the year. This system was first proposed by Kenneth Valentine (JRM, 1967, 20:395) for use on desert ranges in southcentral New Mexico. When seeded



*In the Intermountain West lowland shrub range such as shown above is most efficiently used in the winter while upper elevation areas are optimally used in the summer. This type of grazing scheme is called seasonal suitability grazing.*

pastures are used in used in conjunction with native range this system is often called complementary grazing. In areas such as the Southwest where local rains can cause considerable difference in forage availability between pastures, livestock are moved to pastures where green forage is available. Under these conditions the grazing scheme is called the "Best Pasture System." Presently all these systems are now commonly referred to "Seasonal Suitability Grazing Systems." The application of seasonal suitability grazing to various regions of the western United States is discussed in detail by Holechek and Herbel (Rangelands 1982, 4:252). Seasonal suitability grazing is most practical in the intermountain regions of the western United States where ranches usually have a diversity of forage resources. Fencing costs associated with this system can be minimized in arid areas by fencing watering areas and using water availability as a tool to control where livestock graze.

### Grazing Systems for Riparian Zones

Continuous grazing is most damaging to streamside areas (riparian zones) and wetlands because livestock congregate and linger on these areas due to convenience of forage, water, and cover. Riparian zones are the most important part of the range from the standpoint of wildlife, water quality,

*In Oregon separate fencing and delay of grazing until late summer has been beneficial in terms of vegetation, livestock and wildlife on riparian zones in mountainous areas.*

*Big sagebrush ranges with little remaining understory have shown little response to any grazing system including complete livestock exclusion. Control of big sagebrush will be necessary before any improvement in productivity of the above range will occur.*

esthetics, and forage productivity. Many managers and researchers have concluded that the only means of restoring and maintaining these valuable areas is complete livestock exclusion. However, this alternative is unacceptable to ranchers. Recent studies have shown improvement of riparian zones may be possible without complete livestock exclusion.

Replacing cattle with sheep that are herded is a workable solution in some areas where livestock operators graze both animals or can switch from one animal to another without economic hardship. Herding of sheep permits careful control of grazing timing, frequency, and intensity on riparian zones.

Researchers in Oregon have found that fencing and delayed grazing of riparian zones on mountain rangeland can be beneficial to wildlife, livestock, and vegetation. Their scheme involves restriction of cattle to upland areas until late summer when the gates are opened to the riparian zones and meadows. By this time nesting birds and small mammals have completed critical activities associated with reproduction. The growing season is over so impacts on vegetation are minimal. The intensity of grazing can be controlled by the time at which cattle are permitted access to the riparian zone and are removed from the zone. Livestock performance under this strategy has been found to equal or exceed season long use of the riparian zone. Problems associated with gathering cattle for removal in the fall are greatly minimized because the cattle are concentrated on a small area of flat terrain with good visibility. The only drawback to this scheme is the cost of fencing.

## Conclusions

Specialized grazing systems involving rotation of livestock are necessary on some but not all ranges to prevent destruction of preferred forage plants and aeas. There is no one system that will work best for all situations but each system can give good results under the right conditions. Specialized grazing systems are most needed in the Intermountain West where wide differences exist in palatability of plant species and convenience of areas for grazing. In the central Great Plains which have flat terrain, good water distribution and plants of similar palatability with high grazing resistance, continuous grazing coupled with periodic restriction of livestock from convenient (sacrifice) areas by temporary fencing and/or control of access to water will maintain or improve range condition. Short duration grazing is a new system that appears quite promising for productive grassland ranges on flat terrain. The Merrill three herd/four pasture system has been superior to continuous grazing on Texas rangelands where effective precipitation can occur any time during the year and common use grazing is practiced.

For any grazing system to work it must be tailored to the needs of the vegetation, terrain, type or types of livestock, and the particular ranching operation involved. It is important to recognize that wide fluctuations exist in the forage resource from year to year. Therefore both stocking rate and time of grazing must be flexible. Any system that involves excessive use of one pasture in order to rest another will probably fail from livestock, wildlife vegetation, and soil standpoints.

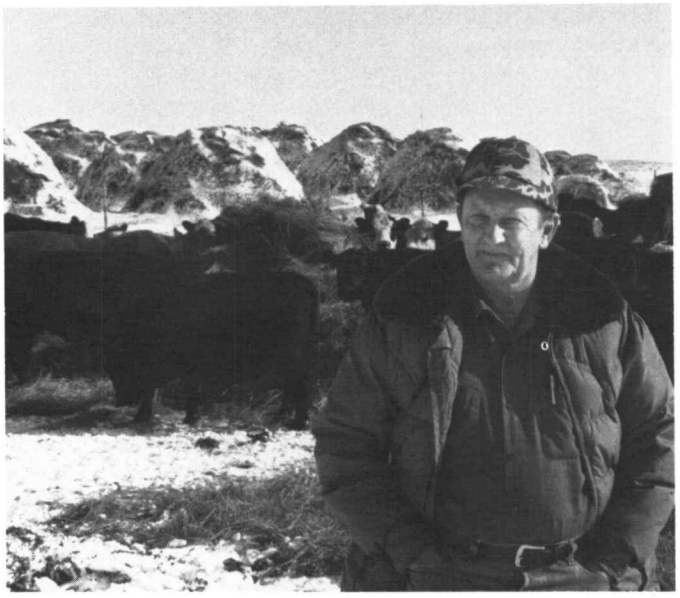
# Steps and Requirements in Establishment of Grazing Systems

**Sid E. Salzman**

**The highest priority in establishment** of a different grazing system is an evaluation of the operation. Does the rancher really want a different grazing system? If the answer to that question is no, then it makes no difference how good a new grazing system may be; it is condemned to failure. The operator can make a good grazing system fail and a poor system work. To emphasize the importance of the operator, some of the attributes that an operator must have to maximize the opportunity for the successful establishment of a grazing system are outlined. He should have a genuine interest in grass, a note at the bank, enough greed to want to make more money, willingness to take a chance, nerve enough to withstand criticisms of neighbors, willingness to accept and heed advice from technical people, and the time and inclination to observe and evaluate his program and to constantly update it. Well-meaning technical people can urge ranchers to adapt new grazing programs without considering the capabilities or management objectives of an operator. This can lead to failure because the grazing system didn't "fit" the operator and as a result everyone lost and a good grazing practice was discredited.

Forage resources must be evaluated thoroughly as the next step in the establishment of a grazing system. The grass inventory is the first area to examine, which is relatively easy to do with the help of a range specialist. He will evaluate the carrying capacity of a ranch on an annual and monthly basis. The monthly evaluation of production is very important because the poorest month of feed production is the limiting factor, determining the number of cattle available to utilize the production from the best month. Traditionally, the winter months in the Sandhills of Nebraska are the limiting months. Next, practices to increase the low months of production to match the high months of production, allowing more complete utilization of production during high months, must be considered. Some of the possibilities to increase these poor months are: use of crop residues, fertilization of hayland, supplemental feed, irrigated pasture, and hay. Another possibility is to buy more cattle in the high months of production and stock the basic herd for the poor months. These are not all the possibilities; they are merely used to point out alternatives available to solve this monthly feed flow in the Sandhills.

**The next step is to analyze** the cattle inventory. The number of cattle is not the most important thing. The class of cattle is the most important criterion in setting up a range-forage program. There are several kinds of cattle available to ranchers: fall cows (cows that will calve in August and September), spring cows (cows that will calve in March and April), yearlings and combinations of all three. Each class of cattle has different times of the year for their peak food requirement. By matching peak feed requirements and peak range production, a balance can be achieved. When the cattle and the grass resources are balanced, the operator has become a range manager.



*Sid Salzman feeds a lot of hay during the winter. He will then use gestating fall cows to clean up the stock yards and feeding areas in the spring. (Photo by the Soil Conservation Service.)*

On our ranch near Ainsworth, in north central Nebraska, the range is in mostly good condition with 25% of the ground in wet hay meadows producing large amounts of winter feed. Today, our operation is very accessible to alternative forage areas such as corn stalks and feedlots.

When our original grass inventory was made in 1964, these other forage areas weren't available so they didn't enter into the original considerations in developing a range program. The grass inventory indicated a productive range with more winter feed than summer feed—a contrast to the traditional ranch. This grass inventory dictated several alternatives, one of which was the use of more cattle to consume hay such as yearlings and fall cows, grazing of hay meadows, renting more pasture, selling hay, and most important, the development of the grazing programs to increase pasture production. The use of all these alternatives were adapted except selling hay because, like most ranchers, we never want to

Salzman is a rancher from Ainsworth, Nebr. This is the script of a talk he presented at the Third Annual Rangeland Symposium at Lincoln, Nebr., April 21, 1982. The Symposium entitled "Grazing Programs for Nebraska" was sponsored by the University of Nebraksa-Lincoln Range Management Club.

decrease our cattle numbers and this allowed us to increase. We ran more fall cows and yearling steers to utilize excess hay in the winter, retained our spring cows to clean up the rough feed in the fall, started renting pasture, started grazing wet hay meadows, and adapted a deferred rotation grazing system to get more production from our own range. We were just beginning to get the "bugs" out of these new methods when irrigated corn stalks and feedlots made their appearance in our area. This enabled us to increase the spring cow herd to utilize corn stalks and allowed us to increase summer stocking rates since cattle could leave range early and go to the feedlots.

Recently, early winter weaning of the fall calves has been implemented. This saved 1 ton of hay per cow and gave us a group of cows to clean-up "junk" feed in the spring of the year when previously we did not have any use for it. Junk feed includes quackgrass *(Agropyron repens)* areas, stackyard with hay mats, weeds in wintering ground, and corn fields previously grazed by spring cows. Junk feeds will provide a maintenance ration, although there will be a temporary weight loss on gestating cows. These forage and cattle management changes are mentioned to illustrate the flexibility required in grass programs.

**We feel the application of** these grazing systems has helped our operation. It has not been without mistakes and I want to pass along a little philosophy and feelings we have developed about our grazing programs. We personally like a 4-pasture rotation and use some 3-pasture rotations. We do not like a 2-pasture rotation as well because we always have cattle in the wrong place at the wrong time. We have moved away from a structured and disciplined rotation on much of the ranch and basically try to graze a pasture intensively with large numbers of cattle so that the grazing period is from 20-30 days and aim for 70% utilization. I am convinced that intensity of grazing doesn't hurt a pasture, even a sandy one, if the grazing period doesn't exceed 30 days. Under this type of grazing the condition class of our pastures has improved. We graze our pastures not by the calendar but by when the grass is gone. This is not to imply that structured systems are not useful. They are the place to start in rotation grazing; as confidence builds with grazing programs, other programs can be considered. Gains are not quite as good under rotational grazing and since some pastures are rented, cattle that are merchandized (the yearlings) are put in rented pastures under continuous grazing. Wet hay meadow grazing has some problems—wet ground in spring, patch grazing unless there is a high stocking rate, and a tremendous fly problem starting in the middle of June. Dry fall cows graze this ground since they do an excellent clean-up job and the gain in May and June is not critical on this group of cattle.

This may appear to be a pessimistic evaluation of grazing systems. However, it is merely to caution that sometimes no change in a grazing program is best. A grazing program must fit the man, the ranch, the cattle and be flexible to be successful.

Manipulating the grazing program within the constraints of forage, livestock, and current markets for optimum return is very dynamic. The manager's job is not completed when a grazing program is implemented. The challenge is just beginning.

# NCA "Technology Development" and "Cattle Businessman" Awards

*Editor's Note:* Work in range management should be very valuable for this contest. Hurry and don't miss the deadline.

The National Cattlemen's Assn, has released information on its new "technology development" award. The award will be presented annually to an individual or individuals for the discovery, development and/or application of technology which materially increases efficiency and profitability of beef cattle production.

The new award, to be presented at the 1984 NCA convention during January in New Orleans, is being sponsored by the IBP Foundation. IBP will contribute $10,000 to the NCA foundation on behalf of the recipient. The NCA foundation will use the money to foster research and education programs for the betterment of the beef cattle industry.

In addition, IBP will provide the award winner with $1,000 in cash and will pay expenses to attend the 1984 NCA convention in New Orleans. The recipient will also receive a limited edition bronze entitled "A Special Breed," created by Oklahoma artist Jim Miller and commissioned specifically for this award.

Each award nominee must be an individual (not a company) or individuals involved in a team effort, and may be from commercial industry, government, educational and/or other research institutions, or may be a private producer.

The National Cattlemen's Assn, has also announced plans for its new "cattle businessman of the year" award. The award will be presented annually to an individual cattleman who has demonstrated outstanding and innovative business management and who, as an industry leader, has made significant contributions to beef production.

The 1984 award, to be presented at the 1984 NCA convention in January in New Orleans, is being sponsored by the Ralston Purina Co. Purina will contribute $10,000 to the National Cattlemen's Foundation, which sponsors research and education programs. The company also will provide $1,000 in cash for the award winner, a permanent plaque for display in NCA headquarters, and expenses for the recipient to attend the 1984 convention.

Each award nominee must be a producing cattleman (not a company) who generates a substantial portion of his/her income from the beef cattle business. Criteria to be used by the selection committee will include such things as use of production technology, record keeping, financial planning, marketing, risk reduction and resource management.

Nominations and supporting material must be received by NCA at its national headquarters no later than Oct. 31, 1983. *Nomination forms and further information may be obtained by contacting Sandy Gallagher, NCA, P.O. Box 3469, Englewood, CO 80155 (303/694-0305).*

# Buffalograss: Home on the Range, but Also a Turf Grass

Tom Pozarnsky

## On the Range

There has been an almost romantic interest in buffalograss, with its inference of "food of the buffalo." As early as 1856 it had been introduced into Virginia "from the West," as reported in a volume on Agriculture by the U.S. Patent Office. Long of interest to rangemen, recent decades have shown increasing interest by turf specialists.

In earlier times, almost every locality where bison had once roamed had at least one grass known locally as buffalograss. It was usually some tall coarse species befitting the image of the big rugged buffalo. Since the 1st edition of Standardized Plant Names in 1923, *Buchloe dactyloides* alone has come to be known as buffalograss; but, it is a short, fine-bladed species.

In times of the great buffalo herds, this grass occurred mostly in the steppe or dry plains region of central North America but also eastward locally in prairie areas. Its natural distribution extended from central Montana to western Minnesota and northwestern Iowa, south to western Louisiana, Texas, Arizona, and northern Mexico. It occurs mostly on soils of high clay content and its tolerant of some salinity. It does not occur on sands, as in sandhill rangelands, and does not succeed on sandy soils.

Buffalograss can be recognized by hairy, curly-leaf blades usually only 4-5 inches tall and by the presence of stolons or runners. It is closely associated with blue grama which does not have stolons. Buffalograss becomes green in late spring and continues growth all summer. In Manhattan, Kans., it has been shown that growth begins about March 20. The male (staminate) and female (pistillate) plants are borne on separate plants. An occasional plant may have both sexes. The stolons are sometimes 2 to 2.5 feet long. These root freely at the nodes, when ground is moist, to produce additional plants. Under favorable conditions stolons elongate 0.5 to 2 inches per day and form a close, even mat. Areas a yard or more across may be entirely male plants showing flag-like flowering culms 2 to 8 inches tall. Areas nearby without these usually prove to be female colonies with burs, containing seed, borne close to the ground. Birds feeding on the burs distribute viable seed.

Roots of buffalograss were excavated in Colorado, Kansas, and South Dakota, and depths varied from 3 to 7 feet. Despite the low stature of the shortgrass, the root system is extremely well developed.

The female plants produce burs that have 2 or more seeds. When moisture is abundant the burs are produced continuously from midsummer until frost. Seed is difficult to harvest with ordinary equipment, but is generally harvested with suction machines, brooms, or beater equipment.

Buffalograss burs are hard and nearly waterproof, and unless the burs are treated the seed does not germinate readily. The seed can easily be released by breaking down the burs with an ordinary hammer mill. Another treatment recommended is to soak the burs for 48 hours in a 0.5 percent solution of potassium nitrate, store them wet for 6 weeks at a temperature of 32° to 40° F., and then dry them quickly.

*Buffalograss areas increasing on left of fence where continuous heavy grazing is reducing competition from taller grasses—a Fair condition range. Excellent range condition is on right where grazing is controlled. If overuse continues (on left) buffalograss will increase until the entire pasture is almost a pure stand.—SCS Photo*

Buffalograss produces palatable and highly nutritious forage but it probably never was as common as often supposed because blue grama has been mistaken for it. In semiarid climate the foliage cures on the ground and furnishes nutritious forage during the nongrowing season. Research at Stillwater, Okla., showed this trait was lost in sub-humid climate. Buffalograss cannot endure the competition of taller species and is of little importance in true prairie. When taller species are reduced by heavy range use buffalograss will increase. Its increase is at the expense of much more productive taller grasses. It withstands close grazing and trampling in a remarkable manner. If overuse continues buffalograss will increase until the entire pasture is almost a pure stand. The leaves grow so near the soil that much of the green tissue remains even when closely grazed. This explains in part why this grass can withstand heavy grazing and why it persists where all perennial mid-grasses have disappeared. It spread rapidly by stolons which root readily when they come in contact with moist soil. On almost all kinds of range sites it is an increaser species when judging range condition. Despite its low production it provides other benefits like helping to control erosion when taller species have been depeleted, especially on soil that does not contain

Author, (Tom Pozarnsky) is a former range conservationist, Soil Conservation Service, retired.

too much sand. In the southern plains it is valued for control of wind erosion.

*Tom Pozarnsky and Maurice Davis, range conservationist, Soil Conservation Service, check density of buffalograss lawn established almost exclusively by the use of plant plugs. It was established in one growing season.*

*BEFORE Photograph of steep area with weeds and erosion possibilites—to be established to buffalograss using plugs. This is on a corner lot.*

*AFTER Photograph shows buffalograss established and occupying the area, offering protected cover. In photo Al and Harriet Skram, Pierre, S. Dak.*

**Buffalograss as a Turf Grass**

Buffalograss use in lawns has been on the increase because it conserves energy, withstands heavy traffic, tolerates heat, survives with minimum of moisture, controls weeds, resists diseases and insects, does not require commercial fertilizers, and reduces the need for frequent mowing as in conventional lawns, thus reducing injuries. Being a warm-season grass it does not green up as early in the spring as do cool-season grass lawns. Buffalograss has been tried with zoysia grass in central South Dakota and it was shown that buffalograss was more competitive.

Buffalograss lawns can be established by sodding, seed, plugs, or stolons. However, use of seed or sod pieces is the most practical. It is less effective when stolons alone are used. Sod pieces or plugs about 3 or 4 inches in diameter placed one foot apart usually results in a complete sod cover by the end of the growing season. Plugs or seed should be placed in a prepared seedbed for best results. Some watering during a dry period and controlling weeds is highly desirable in the semiarid region to establish a continous sod in one season. Where it is planned to establish a stand by use of seed it should be seeded in late spring. Also use locally adapted seed for best results. Seed is available from some commercial sources.

*"BEFORE" PHOTO of buffalograss plugs installed in the spring about one foot apart. Watering and weed control is needed to attain complete ground cover in one season.*

*"AFTER" PHOTO of buffalograss, a native shortgrass, completely covering the ground by the end of the growing season. Plants spread rapidly by surface runners. This lawn in Pierre, S. Dak.*

Buffalograss has also been used with success on highway shoulders, airport runways, boulevards, picnic areas, roadsides, and golf courses. D.E. Hutchinson of Lincoln, Nebraska reported seedings of buffalograss in a mixture in median and shoulders of Interstate #80 from Gretna Exchange-Nebraska to Colorado and Wyoming borders, and is doing well.

One other feature of a buffalograss lawn is that it will grow well with some short native flowering plants. A part of the lawn can be used to grow such species as scarlet globemallow, spiderwort, short vetches.... You need only to delay time of first mowing to get the maximum blossoming benefits from the plants.

Mowing the lawn, about once a month, is needed primarily to control taller competing species. Grass catchers normally are not needed. If fertilizers result in excessive accumulation of mulch it can be reduced by occasional early spring burning without detrimental effect on that year's buffalograss turf.

Professor of Biology Theo. Van Bruggen of Vermillion, S. Dak., reported use of Tordon 212 and Weed-B-Gon at rates that completely killed leafy spurge in prairie without having any visible effect on buffalograss.

E.J. Dyksterhuis reported that a heavy application of nitrogen fertilizer that "burned" a bermuda grass lawn in Fort Worth, Texas resulted in great increase of buffalograss already present.

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# "Forbs" Need Proper Ecological Recognition

C. Wayne Cook

*Editor's Note:* This article gives a new and fresh look, to some, of the ecological importance of forbs on rangelands.

Many experienced ecologists have recognized forbs as attaining a position of dominance, subdominance, or major species in some ecosystems. However, most range managers still treat them as "weeds" or as "least desirable" plants in most managed plant communities. Their presence is therefore distasteful and demeaning to good range management. This concept should somehow be changed through better knowledge of the true status of forbs in both structure and function of ecosystems. Why treat this life form as an undesirable group of plants in many of our plant associations, particularly with respect to some grassland types? Forbs, not unlike other life forms, have both desirable and undesirable characteristics that should lead to management for their presence or absence. They should not be thought of as weeds but as a true life form or forage class that has an important place in ecosystem structure and function as primary producers.

**Cattle usually prefer** to utilize grasses while sheep prefer forbs and shrubs. This, however, should not imply that forbs and shrubs are not desirable plants on cattle range any more than grasses are not desirable on sheep range. It is not a matter of rating the importance of any life forms from the standpoint of preference by certain species of herbivore but rather one of identifying the status of each species within each life form and its contribution to the biological system in question.

The diversity presented by more than one life form, and the species within each life form, is desirable from the standpoint of potential soil protection and indeed from the point of view that the nutritional level for most herbivores is enhanced over longer time periods. It is well known that warm-season and cool-season grasses complement each other from the standpoint of extending a higher nutritional level over a longer period. This concept is likewise true of broadleaf plants of forbs and shrubs. Shrubs have been given considerable attention with respect to their rather distinct nutritional attributes as compared with grass. Forbs, however, have continued to assume the role of unwanted plants (weeds) on most American rangelands. This categorization for forbs began with Sampson (1923) in his studies from about 1910 to 1917 in the Wasatch Mountains of Utah. However, Ellison (1954), Stoddard (1940) and Oosting (1956) all recognized that most grass and shrubland communities have many forbs that are important constituents. In some cases, they believed that forbs should share the occupational space in the climax community as dominants, co-dominants or sub-dominants along with grasses and shrubs. Certainly, at least seasonally, their abundance and conspicuous flowering give the community a very definite aspect of being a true forb community.

**In many grass-forb communities** there may be a combination of both life forms resembling a 50-50 mixture. But with cattle grazing, forbs may increase in abundance and with sheep grazing grasses may increase in abundance. The point, however, is that there are truly grass-forb mixtures in climax expressions. A change toward one or the other life forms does not necessarily bring about a downward trend or an immediate change in range condition. Some forbs decrease with cattle grazing along with grasses—the extent depends upon the period and degree of use. Likewise, some grasses decrease with sheep grazing on grass-forb range types. The actual indication of a downward trend toward a poorer range condition is an increase in size of bare openings among perennial plant and the occupation of these areas with ephemeral (annual grasses and forbs) plants.

This deteriorated state of plant expression is frequently referred to as a weed stage, which means a dominance of unpalatable perennial plants (mostly forbs) and weedy annuals (both grass and forbs). In most cases this poor range condition is attained only after the interspacial areas among plants have been increased, thus allowing annuals or non-preferred perennials to express themselves rather prominantly. It is true that favorable years may allow annuals to appear even in rather small interspaces among perennial plants, but their appearance during average and unfavorable years indicates that the stand is not a closed community and will eventually allow perennial species (good or bad) to occupy the space if they are present in the locality and are allowed to regenerate themselves.

**There are three primary reasons** why forbs should be recognized as important constituents of many grassland types. First, they may be present as either dominants or subdominants in the ultimate expression (climax) of most of the grassland range types; second, some forbs, like grasses, are readily eaten even by cattle; and third, forbs contribute substantially to a higher animal nutritional level when found in a mixture of grasses than in grass stands alone.

*Recognition of Forbs as Climax Species:* If forbs are considered undesirable from the standpoint of species composition on many western ranges, then many, if not most, of our grassland types that have forbs as major species would be considered in a lower condition class then they actually are. Ellison (1954) and Dix and Beidleman (1969), respectively, found that while mountain parks and grassland ecosystems of the Great Plains had a higher density of grasses than forbs, the diversity of number of species of forbs present outnumbered grass more than 2 to 1. Many times the position of individual forb species in ecological succession in differ-

The author is with the Range Science Department, Colorado State University, Fort Collins.

ent topographic and edaphic environments is not understood.

Ellison (1954) found more than 50 forb species mixed in with about a dozen grass species in the open mountain parks that were intermingled with aspen and conifer stands. It was indicated that only 13 of the more than 50 forbs increased with heavy cattle grazing. Several forb species, like some grass species, decreased with heavy grazing.

Since grasses are fewer in number of species and have received more attention, there is considerably more known about their status in the structure and function of ecosystems. It seems that we should be equally informed about forbs if we are to use their degree of presence or absence as a criterion for managing rangelands in a satisfactory and productive state. Thus, range condition score cards that characterize all forbs as weeds (least desirable) on grass-forb communities may seriously underestimate the condition of the range in relation to climax.

*Recognition that Forbs are Palatable to Cattle:* Both cattle and sheep used many forbs in mountain range of Utah and utilized them heavier as the summer season advanced (Cook et al. 1967). This is because many grasses tend to mature earlier and become less palatable, whereas forbs tend to mature less rapidly and as a result remain more palatable than grasses. In the present study covering 6 years (1960 to 1966) it was determined that cattle consumed almost as many forbs as sheep but they did not consume them as intensively as sheep (Table 1). The study included observa-

**Table 1. Average percent use for forage species for cattle and sheep on mountain summer ranges in Utah.**

| Scientific name | Common name | % Use[1] | |
|---|---|---|---|
| | | Cattle | Sheep |
| Grasses | | | |
| *Agropyron inerme* | Beardless wheatgrass | 51 | 27 |
| *Agropyron smithii* | Western wheatgrass | 26 | 8 |
| *Agropyron subsecundum* | Bearded wheatgrass | 24 | 18 |
| *Agropyron trachycaulum* | Slender wheatgrass | 35 | 27 |
| *Bromus carinatus* | Mountain brome | 29 | 16 |
| *Bromus tectorum* | Downy chess (Cheatgrass) | 3 | 10 |
| *Carex species* | Sedge | 26 | 54 |
| *Danthonia californica* | Oatgrass | 2 | 4 |
| *Elymus cinereus* | Giant wildrye | 52 | 21 |
| *Elymus glaucus* | Blue wild rye | 36 | 4 |
| *Festuca idahoensis* | Bluebunch fescue | 6 | 44 |
| *Festuca ovina* | Sheep fescue | 38 | 14 |
| *Hesperochloa kingii* | Spike fescue | 72 | 55 |
| *Glyceria pauciflorus* | Mannagrass | 71 | 44 |
| *Koeleria cristata* | Junegrass | 61 | 50 |
| *Melica bulbosa* | Oniongrass | 51 | 52 |
| *Poa ampla* | Big bluegrass | 45 | 30 |
| *Poa bulbosa* | Bulbous bluegrass | 2 | 3 |
| *Poa fendleriana* | Muttongrass | 60 | 58 |
| *Poa pratensis* | Kentucky bluegrass | 70 | 60 |
| *Poa secunda* | Sandberg bluegrass | 10 | 30 |
| *Sitanion hystrix* | Squirreltail | 8 | 5 |
| *Stipa columbiana* | Columbia needlegrass | 42 | 3 |
| *Stipa lettermani* | Letterman needlegrass | 43 | 20 |
| Forbs | | | |
| *Achillea lanulosa* | Western yarrow | 3 | 5 |
| *Actaea arguta* | Baneberry | 0 | 0 |
| *Agastache urticifolia* | Horse mint | 16 | 26 |
| *Agoseris glauca* | False dandelion | 2 | 52 |
| *Allium accuminatum* | Wild onion | 5 | 31 |
| *Antennaria dimorpha* | Everlasting | 0 | 1 |
| *Aquilegia caerulea* | Columbine | 10 | 25 |
| *Arabis holboellii* | Rockcress | 0 | 0 |
| *Arenaria congesta* | Sandwort | 15 | 30 |
| *Arnica cordifolia* | Arnica | 5 | 20 |
| *Aster adscendens* | Aster | 37 | 47 |
| *Aster engelmanii* | Aster | 56 | 47 |
| *Astragalus agrophyllus* | Locoweed | 15 | 26 |
| *Astragalus miser* | Milkvetch | 13 | 22 |
| *Balsamorhiza sagittata* | Balsamroot | 24 | 40 |
| *Capsella bursa-pastoris* | Shepard's purse | 30 | 35 |
| *Castilleja species* | Indian paint brush | 5 | 14 |
| *Circium species* | Thistle | 10 | 0 |
| *Collinsia parviflora* | Blue-eyed mary | 0 | 0 |
| *Collomia tenellia* | Collomia | 0 | 0 |
| *Comandra umbellata* | Toad flax | 0 | 10 |
| *Cordylanthus ramosus* | Cordylanthus | 5 | 0 |
| *Cynoglossum officinale* | Hound's tongue | 0 | 9 |
| *Delphinium nelsonii* | Larkspur | 5 | 20 |
| *Descurainia pinnala* | Tansy mustard | 0 | 14 |
| *Disporum trachycarpum* | Fairybells | 0 | 0 |
| *Epilobium angustifolium* | Fireweed | 0 | 0 |

**Table 1. (Continued).**

| Scientific name | Common name | % Use[1] | |
|---|---|---|---|
| | | Cattle | Sheep |
| *Epilobium paniculatum* | Willowweed | 0 | 0 |
| *Erigeron macranthus* | Wild daisy | 6 | 14 |
| *Eriogonum heracleoides* | Buckwheat | 23 | 18 |
| *Fraseria speciosa* | Elkplant | 0 | 0 |
| *Galium boreale* | Bedstraw | 0 | 0 |
| *Geranium fremontii* | Cranesbill | 26 | 18 |
| *Hackelia floribunda* | Stickseed | 2 | 9 |
| *Helianthella uniflora* | Single-flowered sunflower | 60 | 34 |
| *Heracleum lanatum* | Cow parsnip | 65 | 78 |
| *Hieracium scouleri* | Hawk weed | 2 | 11 |
| *Hydrophyllum capitatum* | Waterleaf | 0 | 0 |
| *Lactuca pulchella* | Blue lettuce | 5 | 15 |
| *Lathyrus leucanthus* | Wild pea | 20 | 45 |
| *Linum lewisii* | Prairie flax | 0 | 4 |
| *Lithophragma parviflora* | Woodland star | 0 | 0 |
| *Lithospermum ruderale* | Gromwell | 30 | 16 |
| *Lomatium grayii* | Wild carrot | 0 | 0 |
| *Lupinus caudatus* | Lupine | 36 | 33 |
| *Mertensia oblongifolia* | Bluebell | 28 | 78 |
| *Microseris nutan* | Microseris | 4 | 10 |
| *Nemophila breviflora* | Nemophila | 0 | 0 |
| *Osmorhiza occidentalis* | Sweetroot | 15 | 34 |
| *Ozmorhiza chilensis* | Sweet cicely | 17 | 40 |
| *Pedicularis groenlandica* | Elephant head | 0 | 5 |
| *Penstemon rydbergii* | Penstemon | 5 | 15 |
| *Perideridia gairdneri* | False caraway | 0 | 0 |
| *Phlox gracilis* | Phlox | 7 | 10 |
| *Physaria species* | Bladder pod | 4 | 12 |
| *Polemonium albiflorum* | Polemonium | 10 | 35 |
| *Polypodium species* | Polypody | 3 | 2 |
| *Potentilla glandulosa* | Cinquefoil | 6 | 13 |
| *Potentilla pectinisecta* | Cinquefoil | 41 | 42 |
| *Rudbeckia occidentalis* | Coneflower | 0 | 10 |
| *Rumex crispus* | Curlyhead dock | 0 | 0 |
| *Scrophularia lanceolata* | Figwort | 0 | 2 |
| *Senecio serra* | Groundsel | 20 | 34 |
| *Senecio integerrimus* | Butterweed | 2 | 3 |
| *Sidalcea neomexicana* | Prairie mallow | 10 | 10 |
| *Smilacina racemosa* | False solomon's seal | 10 | 50 |
| *Solidago missouriensis* | Goldenrod | 10 | 15 |
| *Stellaria jamesii* | Starwort | 0 | 4 |
| *Taraxacum officinale* | Dandelion | 20 | 45 |
| *Thalictrum fendleri* | Meadow rue | 5 | 60 |
| *Tragapogon porrifolius* | Oyster plant | 60 | 42 |
| *Trifolium repens* | White clover | 15 | 25 |
| *Urtica gracilis* | Stinging nettle | 0 | 0 |
| *Vaccinium occidentale* | Blueberry | 0 | 9 |
| *Valeriana occidentalis* | Western valerian | 15 | 5 |
| *Veratrum californicum* | Skunk cabbage | 0 | 0 |
| *Viccia americana* | American vetch | 45 | 25 |
| *Viguiera multiflora* | Goldeneye | 10 | 5 |
| *Viola purpurea* | Pine violet | 23 | 14 |
| *Viola vallicola* | Yellow violet | 10 | 11 |
| *Weythia amplexicaulis* | Mule ears | 0 | 5 |
| Shrubs | | | |
| *Acer grandidentatum* | Maple | 0 | 5 |
| *Alnus tenuifolia* | Alder | 0 | 0 |
| *Amelanchier alnifolia* | Serviceberry | 27 | 42 |
| *Artemisia cana* | Silver sage | 0 | 2 |
| *Artemisia tridentata* | Big sagebrush | 5 | 5 |
| *Chrysothamnus viscidiflorus* | Rabbitbrush | 7 | 3 |
| *Mahonia repens* | Hollygrape | 0 | 0 |
| *Pachystima myrsinites* | Myrtle pachystima | 0 | 0 |
| *Populus tremuloides* | Aspen | 2 | 32 |
| *Prunus virginianus* | Chokecherry | 9 | 21 |
| *Purshia tridentata* | Antelope bitterbrush | 34 | 40 |
| *Rosa* species | Wild rose | 2 | 17 |
| *Sambucus caerulea* | Elderberry | 50 | 53 |
| *Symphoricarpos vaccinoides* | Snowberry | 24 | 21 |

[1]Percent use was determined by estimation of percent herbage removed at the end of the grazing period.

tions made from both adjacent cattle and sheep allotments on comparable range and from adjacent fenced pastures where cattle and sheep grazed separately. The range area included open aspen with many intermingled parks that ranged in area from a few acres to as large as several hundred acres. All studies were made on accessible range that was judged to be about 60% parks and 40% open aspen groves. Both species of animal made rather uniform use of both vegetation types. Table 1 is presented in some detail with respect to species utilization because few publications have presented the comparative use of grasses and forbs on grass-forb ranges.

The average production of dry matter was 1,274 pounds per acre on ranges grazed by sheep and 1,078 pounds per acre on ranges grazed by cattle. There were a total of 24 grasses, 84 forbs, and 14 shrubs on these ranges. Forbs made up twice the herbage production compared to grasses and produced about the same amount of herbage as shrubs. The weighted utilization on grasses, forbs and shrubs for sheep was 18, 42, and 8%, respectively. For cattle utilization of grasses, forbs and shrubs was 37, 17 and 9% respectively. The rather light use made of shrubs was a result of the rather light use of substantial amounts of big sagebrush that was present in some of the open parks. Of the total quantity consumed by sheep, only about 14% was grass but 70% was forbs. Of the total quantity consumed by cattle, about equal amounts were composed of grasses and forbs 45 and 37%, respectively. It was thus observed that even though cattle did not utilize many individual forb species heavily, this forage class made up substantial quantities of their daily intake especially in mid and late summer.

*Recognition of Forbs for Higher Nutrition Levels:* The level of nutrient intake of grazing animals is, to a large degree, dependent upon the life forms that are available as forage. Digestible protein available in the forage classes shows that grasses are decidedly deficient after the heading stage, but forbs had adequate or borderline digestible protein throughout most of the summer grazing season. Generally the same trends are evident for phosphorus during the summer grazing season. Grasses when forming the head become rather dramatically deficient in phosphorus which is a very important nutrient for herbivores. Forbs, however, throughout most of the west remain high in phosphorus and meet the grazing animals's nutrient requirement until heavy frost in the fall. Thus, for no other reason than to meet protein and phosphorus requirements of grazing animals, grassland ranges should be managed for a mixture of forbs and grasses in the stand.

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# *Life Members (continued from inside front cover)*

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Warren K. Sandau
Kenneth D. Sanders
Gary Satter
Ted Scherer, Jr.
Al F. Schlundt
Ervin M. Schmutz
Charles M. Schumacher
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Jim Yoakum

# Deformed Calves from Poisonous Plants

**Richard F. Keeler**

Birth of deformed calves is a troubling matter to cattlemen. There certainly are enough problems for ranchers every year with range conditions and market variables, without the additional problems of deformed, unmarketable calves. Cattlemen who know the factors that cause livestock prices to vary can usually manage to make a profit evenso. Likewise when cattlemen understand the causes of deformed calves, they can take corrective action to reduce incidence and still manage to make a profit.

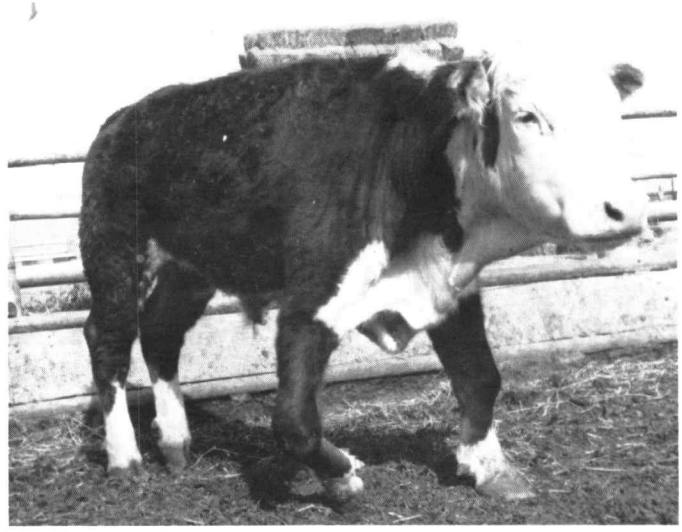
You all know what we are talking about. You've seen calves that were deformed at birth. They might have had crooked legs, crooked spine or neck, misshapen heads, cleft palate, deformed rib cage or other problems. They all share one thing in common. They looked that way at birth. They might have become worse with age. In serious outbreaks of problems like this losses could be 10-30% or even higher some years as some cattlemen have had. Now that's a serious matter and it's certainly understandable that some ranchers who have had problems like this have been reluctant to talk about it for fear there was something wrong with their breeding program. Is this concern warranted?

Are all deformed calves caused by breed problems or in other words are they are of genetic origin? Fortunately, no! There are three main causes of deformed calves. To be sure, some are of genetic origin, but others are infectious disease related, and still others are induced by range plants that cows eat while pregnant. If fact, in some range areas a large proportion are plant related. A competent veterinarian or county agent may be able to help a rancher untangle the puzzle and incriminate one of the three causes.

A number of factors might point to a plant cause for calf deformities: (1) a long history of the problems from year to year in a given area even though of quite variable incidence, (2) occurrence in different cattle breeds or lines, (3) occurrence in calves whose mothers grazed similar ranges during the 1st trimester of pregnancy, (4) no apparent infectious disease problems in the cows during early gestation, and (5) continuation of the problem even when unrelated bulls have been used.

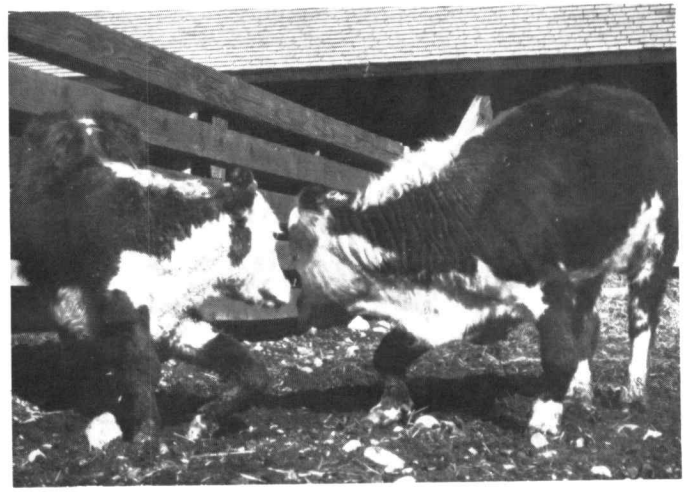
Suppose the problem seems to be plant related, what plants are likely to be responsible? Presently only very few are positively incriminated by extensive feeding trials as causing calf deformities. Some others are speculated to be hazardous. Let's consider three examples where feeding trial information has positively incriminated the plants. The examples are the similar calf deformities induced by *Lupinus sericeus* or *caudatus* (silky or tailcup lupines), by *Conium maculatum* (poison hemlock), and by *Nicotiana glauca* (wild tree tabacco).

The author is with the USDA, ARS, Poisonous Plant Research Laboratory, Logan, Utah 84321.



*A typical crooked calf disease case. The animals may be quite healthy in appearance except for the deformities.*

**Lupine.** A deformity condition that has come to be called crooked calf disease is of widespread occurrence in western United States, Canada, and Alaska. It has been known for decades and most western ranchers have either seen it or heard of it. Incidence is highly variable but can be extremely high. For years it was thought to be of genetic origin although some California ranchers and researchers speculated that one of the lupines *(Lupinus laxiflorus)* might be



*Crooked calf disease in two animals. When the front leg deformities are this severe, the animals are soon reduced to walking about on the knee (carpal) joints because of inability to carry the increased weight on the deformed front legs.*

Lupinus caudatus *(tailcup lupine) in flower in western Wyoming.*

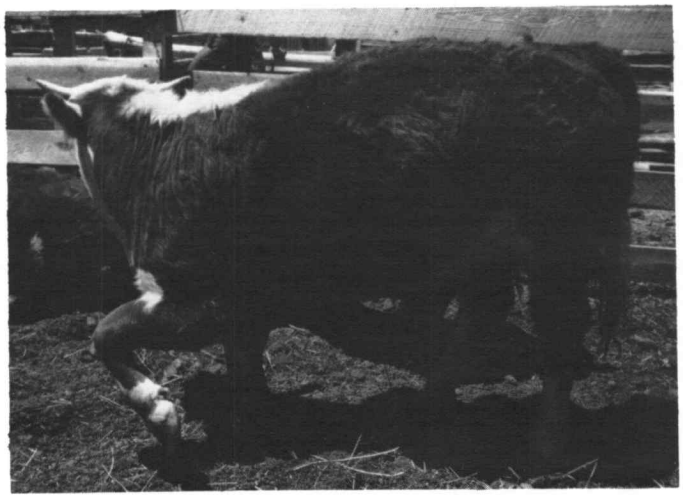
responsible. But it wasn't until about 1966 that it became clear through feeding trials that lupines could produce the condition.

These feeding trials were conducted at the USDA Poisonous Plant Research Laboratory at Logan, Utah. Pregnant cows were fed either silky or tailcup lupines during various periods of gestation and in some cases their calves were born deformed. Both plants produced the condition, but cows were susceptible only during certain periods of gestation. The principal hazardous period proved to be the 40th-70th days of gestation. Based on the results of the feeding trials, we believe that period is the only period of serious concern to ranchers.

Deformed calves in the feeding trials were born with deformities like those of crooked calf disease field cases. Crooked calf disease deformities included bowing or twisting of legs with joints often locked in unusual positions. Either front or rear legs can be involved, but usually front. Careful examination of defleshed leg specimens shows that there can be malalignment of the joint bones or curvature or rotation of long bones. Some animals have spinal or neck curvature in addition to or instead of leg deformities. These curvatures can take on very bizarre forms with a hump or sway or twisting in either the back or neck or both. The head may therefore be cocked in an unusual angle. Sometimes some of the calves may have cleft palates.

So cows are mainly susceptible during the 40th-70th days. If ranchers let no cows of 40-70 day gestation period graze these lupines, the problems would be virtually eliminated. But that's usually not practical because the length of time the bulls are in with the cows may stretch that 40-70 day period over a couple months in many herds. But if the potency of the plant varied during the season, that might also be a factor that ranchers might exploit.

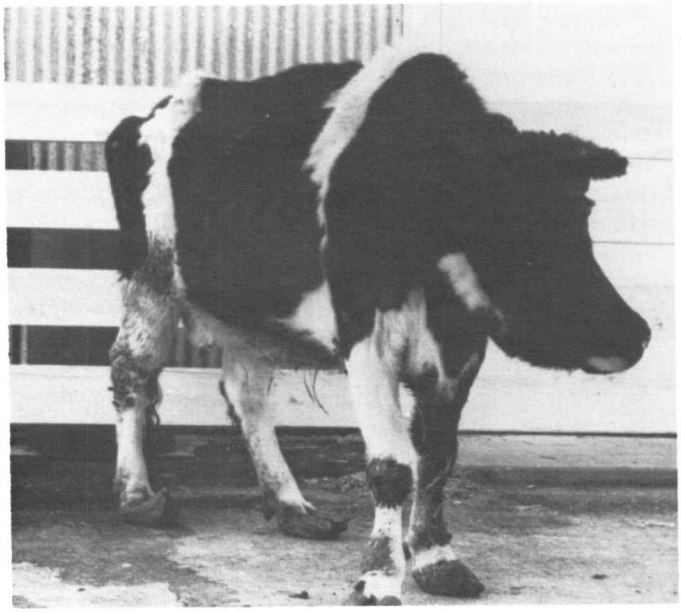
In fact plant potency does vary. Our chemical and feeding trial studies have identified the apparent active compound and shown that the plant is most potent when very young—up to 6-8 inches high, and briefly during seeding—when seeds are mature and before the pods have shattered and released the seeds. Plants are not so hazardous during flowering and after seed pods have shattered. So there are hazardous grazing periods and there are safe grazing periods so far as plant composition is concerned.



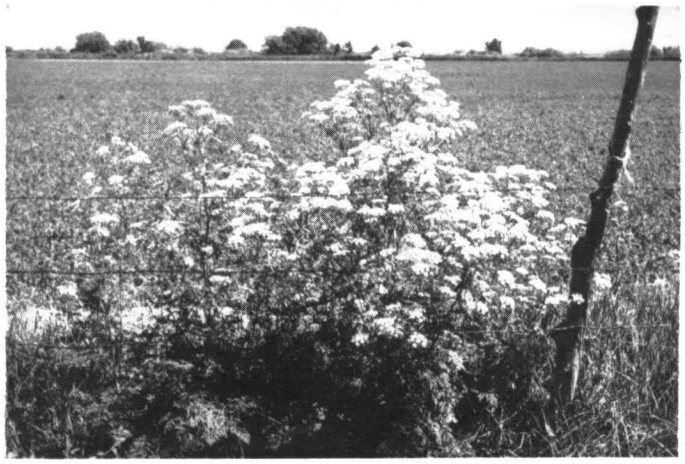
*The deformed legs of crooked calf disease cannot be straightened by the animal, and when severe may result in the leg being locked in a unusable position.*

Armed with these 2 facts (cows are susceptible during the 40th to 70th days of gestation and lupines are most hazardous when very young or in mature seed stages) ranchers and land management personnel can usually shift breeding periods and grazing periods enough to significantly reduce incidence. They can do this without major management changes usually by a slight breeding period shift and by keeping track each year of how lupine growth is progressing and then being a little flexible in grazing periods. Only in a very few cases has the problem been so intractable as to necessitate fall calving or other major management changes.

Are there any other management strategies or other techniques that can be used to reduce crooked calf disease incidence? Many people have advocated supplementation of grazing animals as a means of reducing incidence. There are as many recommended supplements as there are people



*Curvature of the back or neck in crooked calf disease can be quite severe, sometimes resulting in the head being permanently cocked in a most unusual angle.*



Conium maculatum *or poison hemlock in flower in central Utah.*

Nicotiana glauca *or wild tree tobacco growing in western Arizona along the Big Sandy River.*

doing the recommending. Most are based on increasing intake of various vitamins or mineral elements. But we know of no conclusive, scientific evidence that suggests they help. Of course, we haven't seen them all. But we have looked extensively at the experience of 6 ranchers that used vitamin and mineral supplementation of various kinds over about 20 years. Crooked calf incidence varied from year to year and it was often tempting to believe supplements were helping until incidence went up in a subsequent year despite the same supplement. Incidence variations could, however, be traced reliably in every case to gestation period of the cows or potency of the plants, or both, rather than to supplements being used. We believe that ranchers can effectively reduce incidence by using breeding period and plant hazard considerations rather than by other management strategies, although in some cases herbicide application may be practical as a means to reduce abundance of lupine. County agents can usually provide suggestions on herbicide treatment.

**Poison hemlock.** If all deformed calves were due to lupine ingestion by the pregnant cows, the problem would be easier to solve than it is. Actually we know from feeding trials that two other plants will induce similar deformities, and speculate that there may be others. One of these incriminated by feeding trials is poison hemlock. If you have no hazardous-type lupine on your range but are still getting crooked calves, poison hemlock might be the culprit. We have seen a few ranches where this was so.

Lupines are widely distributed on rangelands of North America, whereas poison hemlock is much less abundant but can still be a problem along water courses, ditch banks, and wet meadows. Poison hemlock should not be confused with *Cicuta maculata* (water hemlock) which is often found in similar habitat. Poison hemlock can be identified by purple spots on the stems. Water hemlock does not have these spots.

If pregnant cows of about 40-70 day gestation period graze poison hemlock, deformed calves will likely result. So cows are susceptible during the same period as they are with lupine ingestion. The plants are potent during much of their growth cycle but are usually not very abundant, so the best approach is to eradicate the poison hemlock by cultivation or by herbicide treatment. Again, county agents may be able to make suggestions on herbicide treatment.

**Tree tobacco.** A third plant is known from feeding trials to induce similar deformities when pregnant cows ingest it at about 40-70 days gestation. That plant is wild tree tobacco. It is an introduced plant in the United States and grows only in the southern or warm coastal areas of the U.S. It may be a problem only in Arizona and California and likely of only minor importance even there. It is a plant of very low palatability—even less palatable than poison hemlock, which cows usually avoid. Only the lupines are readily ingested by cows. But tree tobacco can induce the deformities and so should be considered a possible problem. We have no information on incidence of deformities from this plant but speculate that it would be quite low because the plant is so unpalatable.

**Other possible plant causes.** Some of the so-called loco plants like *Astragalus pubentisimus* and *Astragalus lentigenosus* are believed to be responsible for some calf deformities. Extensive feeding trials in sheep have shown the plant will cause lamb deformities. Field investigation of outbreaks and very limited feeding trials in cows at the Poisonous Plant Research Laboratory suggest calves, too, may be susceptible. But extensive laboratory feeding trial work will be necessary before we can be sure that loco plants cause calf deformities.

*Thermopsis* spp. (poison bean plant) may possibly be responsible for some calf deformities. They have in them chemicals like the active ones from *Lupinus,* and are therefore suspect. But extensive feeding trials with various *Thermopsis* have so far failed to produce unequivocally deformed calves. These feeding trials are continuing and are expected to establish whether *Thermopsis* can be considered a hazard.

## Summary

Birth of deformed calves can be caused by plants the pregnant cows ate during periods of gestation. Some members of the *Lupinus* (lupine), *Conium* (poison hemlock), and *Nicotiana* (tobacco) genera are known from feeding trials to produce calf deformities. A few other plants are suspected. When genetic defects or infectious diseases can be ruled out as responsible for an outbreak of deformities, plants may prove to be the cause. When plants can be incriminated, management changes can usually be relied upon to reduce the incidence to acceptable levels.

# Poisonous Plants: Locoweeds

**Lynn F. James**

The locoweeds, certain species of the genera *Astragalus* and *Oxytropis*, are one of the most destructive groups of plants poisonous to livestock.

There are over 300 species of *Astragalus* in North America. The taxonomy of this group of plants is difficult and often requires the help of a trained taxonomist for positive identification. For many years the genera *Oxytropis* was included with *Astragalus*. Many feel that the basis for the separation of the *Oxytropis* from the *Astragalus* was inadequate. Due to this close taxonomic relationship and because of the similarity in the toxic effects of these two genera on livestock, we shall consider them together.

**Description**

*Astragalus* species may be annual or perennial, stemmed or stemless herbs which display a diversity of growth, stature, and general appearance. The leaves are alternate and pinnately compound. The flowers are leguminous. The fruit is a legume pod of various sizes, shapes and surfaces that contains one to many kidney shaped seeds. One of the remarkable features of *Astragalus* is that all species differ from one another in the form or structure of the fruit. The seeds of some desert *Astragalus* may retain their viability for up to 40 years or longer.

*Oxytropis* may be distinguished from *Astragalus* by the keel (lower most petal) of the *Oxytropis* which is prolonged into a long distinct point. The keel petal on *Astragalus* is blunt.

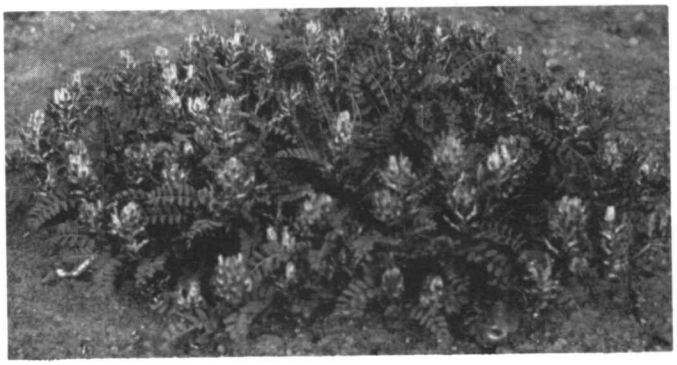
**Toxic Principle**

Not all species of *Astragalus* and *Oxytropis* are toxic. Those that are can be divided into three general groups as follows: (1) about 21 species of *Astragalus* have the ability to accumulate selenium at levels that render them toxic, (2) the nitro-containing *Astragalus* that have as their toxic constituent the $\beta$-D-glycoside of 3 nitro-1-propanol or 3 nitro-1-propionic acid (these plants produce chronic or acute intoxication depending upon the rate at which they are consumed), and (3) locoweeds have been shown to contain an indolizidine alkaloid called swainsonine which is now thought to be the toxin in this group of *Astragalus*.

**Toxicity**

The name loco is derived from the Spanish word for crazy and is used to describe the particular intoxication and the group of plants causing the condition. Many use the term *loco,* incorrectly, to describe all *Astragalus* species

The following is a partial list of the locoweeds: *A. lentiginosus, A. mollissimus, A. wootonii, A. pubentissimus, O. sericea,* and *O. lambertii.* The locoweeds cause numerous problems in livestock, including neurologic effects, reproductive alterations, emaciation, and habituation. Neurological problems are reflected by signs of poisoning which include depression, slow irregular gait, rough hair coat, dull appearing eyes, muscular incoordination, and excitement when stressed. The reproductive consequences include abortions, birth defects, birth of small offspring, and alterations in spermatogenesis and oogenesis.



*The locoweed,* Astragalus lentiginosus.

If animals graze locoweed for a considerable time, they become emaciated and may become recumbent and die. Recovery depends on the extent of intoxication. Animals that have become poisoned may continue to show signs of poisoning when placed under stress. Such animals may recover to the extent they can reproduce but horses that are used for riding or draft purposes become useless and should be disposed of.

Once animals have started to graze locoweed they seem to search for it and at times graze it at the exclusion of other and oft times more desirable forage.

The locoweeds are toxic during all stages of growth and after they become dry. Livestock must graze the locoweeds over an extended period of time before intoxication occurs. The time is closely related to the rate at which they graze the plants. Usually by the time intoxication is obvious, damage has been done to the animal.

*The locoweed,* Oxytropis sericea.

**Conditions of Poisoning**

The desert species of the locoweeds usually germinate and grow during warm moist conditions of late summer and fall. The plant often remains green during the late fall and winter. When the locoweed is green and other forage is dormant and dry, locoweed increases in palatability and animals may start grazing it. They may also start grazing locoweed during periods of drought when little other forage is available, especially if the locoweed is green. However, livestock have become intoxicated on dry plant material. Livestock may start grazing locoweeds for no apparant reason. The locoweeds are not considered to be especially palatable.

**Prevention**

Maintaining ranges in a good condition with a variety of desirable forage species is the first step in preventing locoweed poisoning. Livestock should be prevented from starting to graze the locoweed plant. This may involve supplemental feeding programs, or development of locoweed free pastures. If livestock start grazing locoweed, they should be moved from the areas infested with the plants; only the offending anmals may need to be moved.

The locoweed *Oxytropis sericea* has been successfully controlled in some areas by spraying it with 2 lb of the low volatile ester of 2,4-D.

**Selected Reading**

**James, L.F., W.J. Hartley, and K.R. Van Kampen.** Syndromes of Locoweed Poisoning. Amer. Jour. Vet. Med. 178:146-150. 1981.

# A New Year • New Programs • New Challenges • New Opportunities

During the Gulfport meeting we presented a composite of ideas from members and the staff to the Board of Directors. The following are some of the ideas we present for your review and support.

Remember that your committee, the staff, and the Board can develop programs and present ideas and approaches to help increase membership.

Membership is and always will be a Section responsibility. Only with your cooperation, hardwork, and dedication can we increase membership. Only with membership growth can we increase the awareness of the importance of the proper use of the range resource.

The following are some of the programs we hope to pursue in the 1984 membership year.

1. We plan to bill all members on September for the upcoming year. Another billing will be sent out in December. Reminders will be mailed on January 20 and March 20.

2. The staff has completed a list of all dropped members for 1980, 1981, 1982. These people will also receive the billings mentioned in item 1. (Might be surprised by how many rejoin who are already acquainted with SRM.

3. The staff, committee, and Section officers will work together to compile listings of all people from USFS, SCS, Extension, BLM, BIA, state fish and game, and others who have interests in range. We hope to work hard to see that all these people are contacted about SRM and the benefits of membership.

4. We plan to establish an Industry Sustaining Membership Category and have this in place for 1985. Will probably work on some people for 1984.

5. We plan to establish recognition plaques to recognize different groups for increases in membership. We will recognize the first, second, and third place winners in each of these categories.

A. The Section with the greatest percentage of increase membership.

B. We will recognize the top three members who have recruited the greatest number of memberships other than student memberships.

C. We will recognize the top 3 student or youth organizations with the greatest percentage increase in membership.

Guidelines for the awards will be sent to the Sections and published in the next *Rangelands*.

6. The Denver Staff is reinstating the program of yearly stickers for your membership certificates. Stickers for the years 1980, 1981, 1982, and 1983 are also available upon request to the Membership department. The 1984 sticker will be enclosed with 1984 Dues Notice.

7. We strongly suggest that membership information be displayed at all SRM Functions and that strong efforts be put forward to solicit new members at these functions.

8. We would appeal to all members to consider life membership in SRM—a real savings to the member and also a financial boost for your Society.

9. We encourage presenting membership information and reminders in all Section newsletters.

You have all heard that if each of us were to solicit a new member we could double our members. In 1983 we stayed even. We dropped 20% in old members and solicited 20% new members. Sadly this is the story for the last several years.

This year let's work to keep all of our present members and work for a 25% increase in new members. By working together we can do this. It takes the coordinated effort of the society, the BOD, the staff, your membership committee and the Section membership committees and each and every one of us to get this important job done.

Let's make 1984 the year SRM membership has a marked and lasting increase.

Your Membership Committee
**-Art Armbrust,** Chairman,

# The "Wrong Rock" in Coal Mine Reclamation

Larry L. Larson

## The Game

Many people in childhood, play a game called "wrong rock." The game consists of a child, a dog, and a variety of rocks. "Wrong rock" begins with the child throwing a rock and encouraging the dog to go fetch. When the dog returns with the rock, the child simply says "wrong rock" and throws another rock, continuing the game until the dog tires. There is an analogy that exists between this game and the coal regulatory program. Regulatory requirements are rarely described to the extent a mine operator knows or understands what is needed by a regulatory agency to approve a permit application. The regulator simply encourages the operator to obtain a permit, while stating the regulations in song and verse. The operator then proceeds to develop a permit application based on his interpretation of the regulations. Returning, he finds that the rock he has provided is not the right color or shape and the game of "wrong rock" begins. "Wrong rock" can be found throughout the system forming a circle between federal, state, and private groups. The game began with the politicians, but a review of the game rules demonstrates the extent of the dilemma.

## The Rules

Within the framework of the Surface Mining Control and Reclamation Act of 1977 (SMCRA) the game of "wrong rock" is the breeder of the inconsistencies in the interpretation and implementation of reclamation programs. Each of the SMCRA players whether politician, civil servant, or mine operator has a rock that he is fetching at all times. The political rock was initially tossed by the mine lobbyist and special interest groups in their attempt to define reclamation. The rock that was retrieved (SMCRA) contained veins of environmental and economic concerns. The politician thinking he had found the right rock in SMCRA sent the regulators out to locate a rock called regulations. This in turn was passed on to industry by the regulatory agencies so they could also find a rock (reclamation plans) that matched the political and regulatory rocks. As the mine operators became disgruntled with the search for the perfect rock, their frustrations were again voiced in the lobbyist scream of "WRONG ROCK!!". The cycle begins anew.

The author is the former regional statistician/plant ecologist for the Western Region (V) of the Office of Surface Mining (U.S. Department of Interior), and is currently an assistant professor of range science at the Faculty of Forestry, The University of British Columbia, Vancouver, B.C. Canada V6T 1W5.

## The Dilemma

The Surface Mining Control and Reclamation Act emphasizes the reduction of federal regulatory involvement and the transfer of regulatory responsibility to state and local government (PL 95-87 Sec. 101). The present cosmetic attempt to improve the federal regulatory program is delaying and diverting the intent of the Act through regulatory inconsistency and will result in the creation of more "wrong rocks" not less. It is inconceivable to expect anything but chaos when you realize that federal regulatory agencies are being reorganized, federal regulations are being rewritten, state programs are being reviewed, and mine permits are being approved, all at the same time.

The Surface Mining Control and Reclamation Act of 1977 is a law, and like many other Acts passed by Congress it has games being played around it. The games occur because of short sightedness that focus on extreme interpretations of regulations rather than the achievement of the original intent of the Act. Regulations when left to individual interpretation by regulators and mine operators produce right rocks some of the time and wrong rocks most of the time. It is not until guidelines accompany regulations that clarity and consistent interpretations of the Act are realized. Federal regulations direct reclamation by providing a framework of minimum federal requirements (PL 95-87 Sec. 201). These requirements include phrases such as productive landuse, diverse effective and permanent vegetation cover, proper management, and good husbandry practices to name but a few. Each of these phrases represent different types and methods of land management, depending on your location within the nation. Yet these regional differences must comply with the federal regulation and meet the intent of the Act. Thus it is the role of the guidelines rather than the federal regulations to emphasize local needs and demands, while maintaining the accuracy and integrity of the program. It is time to direct our concerns away from the political games and back to the national goal of reclaiming mined land to a state that will be beneficial to the nation in future generations. This can only be achieved when guidelines are provided at the state and local level, but guidelines cannot be developed while the rules for the right rock are constantly being changed.

# Current Literature of Range Management

This section has the objective of alerting SRM members and other readers of *Rangelands* on the availability of new, useful literature being published on applied range management. Readers are requested to suggest literature items—and preferably also contribute single copies—for including in this section in subsequent issues. Personal copies should be requested from the respective publisher or senior author (address shown in parentheses for each citation).

**Alberta Forage Manual;** by S. Smoliak, M. Bjorge, D. Penny, A.M. Harper, and J.S. Horricks; 1981 (4th Rev.); Alta. Agric. Agdex 120/20-4; 86 p. (Print Media Branch, Alberta Agriculture, 9718 - 107 St., Edmonton, Alta. T5K 2C8) Provides comprehensive recommendations for irrigated and dryland pasture and hay production with emphasis on forage species, seeding rates and practices, grazing management and harvesting and forage insects and diseases.

**Alberta Sheepman's Manual;** by H.D. Scheer (Ed.); 1978 (3rd Ed.); Alta. Agric. Agdex 430/20-1; var. paged. (Print Media Branch, Alberta Agriculture, 9718 - 107 St., Edmonton, Alta. T5K 2C8; reprinted 1982) A comprehensive manual compiled from various sources with chapter headings on sheep enterprises, breeds, selection, facilities, management, nutrition, predation, health, production costs, and meat processing.

**Biotic Communities of the American Southwest—United States and Mexico;** by David E. Brown (Ed.); 1982; Desert Plants 4(1-4):1-342. (Boyce Thompson Southwestern Arboretum, P.O. Box AB, Superior, Ariz. 85273; $13.95 postpaid) Describes and documents recognized biomes in the Southwest in relation to wildlife species and habitat needs; a combination special issue; a companion map, "Biotic Communities of the Southwest," available free from Rocky Mtn. For. & Range Expt. Sta., 240 West Prospect, Fort Collins, Colo. 80526.

**Canopy Development in Lodgepole Pine: Implications for Wildlife Studies and Multiple Resource Management;** by Dennis M. Cole; 1983; USDA, For. Serv. Gen. Tech. Rep. INT-139; 13 p. (Intermtn. For. & Range Expt. Sta., 507 - 25th St., Ogden, Utah 84401) Correlates lodgepole pine stand development models with wildlife behavior and cover requirements; also considers silvicultural manipulation of natural stands.

**Ecology and Culture of Selected Species Useful in Revegetating Disturbed Lands in the West;** by Clinton H. Wasser and Jennifer Shoemaker; 1982; USDI, Fish and Wildl. Serv. FWS/OBS-82/56; 347 p. (USDI, Fish & Wildl. Serv., Washington, D.C. 20240) Presents ecological information about 98 selected plant species; individual species sections includes origin, species characteristics, environmental relationships, culture, management, associated species, pests and diseases, and improved varieties; well illustrated; selected bibliography.

**Ecology and Management of Huisache on the Texas Coastal Prairie;** by C.J. Scifres, J.L. Mutz, and D.L. Drawe; 1982; Tex. Agric. Expt. Sta. Bul. 1408; 21 p. (Texas Agric. Expt. Sta., Texas A&M Univ., College Station, Tex. 77843) Compiles information about huisache including recent research findings and serves as a reference for range resource/wildlife habitat management of huisache areas.

**Ecology of Pinyon-Juniper Vegetation in the Northern Sacramento Mountains;** by Gordon A. Lymbery and Rex D. Pieper; 1983; N. Mex. Agric. Expt. Sta. Bul. 698; 48 p. (N. Mex. Agric. Expt. Sta., N. Mex. State Univ., Las Cruces, N. Mex. 88003) A study to determine the influence and significance of topographic, edaphic, and climatic variables on the structure of the pinyon-juniper community.

Compiled by John F. Vallentine, Professor of Range Science, Brigham Young University, Provo, Utah 84602.

**Effects of 2,4,5-T Spraying on the Microbial Activities of an Arid Rangeland;** by W.C. Lindemann and J.A. Ryder-White; 1983; N. Mex. Agric. Expt. Sta. Res. Rep. 506. (N. Mex. Agric. Expt. Sta., N. Mex. State Univ., Las Cruces, N. Mex. 88003) Spraying with 2,4,5-T was found to have no deleterious effects on the soil microflora of mesquite dunal or interdunal soils.

**Efficacy of Permanent and Temporary Pellet Plots in Juniper-Pinyon Woodland;** by David J. Freddy and David C. Bowden; 1983; J. Wildl. Mgt. 47(2):512-516. (Colo. Div. Wildl., P.O. Box 252, Kremmling, Colo. 80459) Compared estimates of mule deer pellet-group densities using permanent and temporary plots with observations on cost, efficiency, reliability, and application.

**Evaluation of Winter Food Choices by Tame Mule Deer;** by R.M. Bartmann, A.W. Alldredge, and P.H. Neil; 1982; J. Wildl. Mgt. 46(3):807-812. (Colo. Div. Wildl., 317 W. Prospect, Fort Collins, Colo. 80526) Objective of study was to determine if forage selections by tame deer maintained on artificial feed in a pen environment were similar to those browsing pinyon-juniper winter range.

**Fire Ecology of Montana Forest Habitat Types East of the Continental Divide;** by William C. Fischer and Bruce D. Clayton; 1983; USDA, For. Serv. Gen. Tech. Rep. INT-141; 83 p. (Intermtn. For. & Range Expt. Sta., 507 - 25th St., Ogden, Utah 84401) Summarizes available information on the effects of fire as an ecological factor on major tree species, undergrowth, forest fuels, and forest succession; directed primarily to fire management on forest habitats but with implications to forest-range.

**Handbook of Water Harvesting;** by Gary W. Frasier and Lloyd E. Myers; 1983; USDA Agric. Handbook 600; 45 p. (USDA, Agric. Res. Serv., Washington, D.C. 20250 or U.S. Govt. Printing Office, Washington, D.C. 20402) Describes methods and materials used in collecting and storing precipitation runoff for drinking water; also emphasizes site selection and maintenance of water harvesting systems, i.e. catchment basins.

**A Meadow Site Classification for the Sierra Nevada, California;** by Raymond D. Ratliff; 1982; USDA, For. Serv. Gen. Tech. Rep. PSW-60; 16 p. (Pacific Southwest For. & Range Expt. Sta., P.O. Box 245, Berkeley, Calif. 94701) Describes 14 meadow range site classes; includes a key to the meadow classes.

**Procedures for Evaluating Predation on Livestock and Wildlife;** by Dale A. Wade and James Bowns; 1982; Tex. Agric. Ext. Bul. 1429; 41 p. (Texas Agric. Expt. Sta., Texas A&M Univ., College Station, Tex. 77843) Describes and illustrates for various predatory mammals and birds preying upon livestock and game animals their methods of attacking, killing, and/or feeding, type of wounds caused, their tracks, and other evidence that may be left.

**Producing Maximum Alfalfa Hay Yields and Quality Under Irrigation;** by D.K. Ryerson, G.A. Lee, D.E. Falk, R.L. Forster, et al.; 1982; Idaho Agric. Ext. Bul. 612; 11 p. (Agric. Info., Univ. Idaho, Moscow, Ida. 83843; 25¢) A practical publication directing attention to alfalfa stand establishment, management, harvesting, and economics.

**Range Improvements—Today and Tomorrow;** by W. James Clawson (Ed.); 1983; U.S. MAB-3 Grazing Lands Comm. Special Report; 30 p. (Agronomy Extension, Univ. Calif., Davis, Calif. 95616) Symposium of five papers presented at SRM Annual Meeting, Albuquerque, N. Mex., Feb. 15, 1983.

**Russian Wildrye Nutritional Adequacy and Chemical Composition;** by J.F. Karn, L. Hofmann, and R.J. Lorenz; 1983; Agron. J. 75(2):242-246. (USDA, ARS, Northern Great Plains Res. Center, P.O. Box 459, Mandan, N. Dak. 58554) Examined the effect of sampling dates and mineral fertilization of Russian wildrye on mineral levels in forage with possible relationships with grass tetany or low animal performance.

**Sagebrush-Grass Habitat Types of Southern Idaho;** by M. Hironaka, M.A. Fosberg, and A.H. Winward; 1983; Idaho For., Wildl., and Range Expt. Sta. Bul. 35; 44 p. (For., Wildl., and Range Expt. Sta., Univ. Idaho, Moscow, Ida. 83843) Classifies sagebrush-grass habitats for range management; provides information on soils and management implications for each type; presents descriptive keys for sagebrush identification.

**SPUR—Simulation of Production and Utilization of Rangelands: A Rangeland Model for Management and Research;** by J.R. Wight (Ed.); 1983; USDA Misc. Pub. 1431; 120 p. (USDA, Agric. Res. Serv., Washington, D.C. 20250) A symposium of papers on various aspects of the SPUR model; a report of progress with plans for further development.

**A Summary of Range Seeding Trials in Colorado;** by W.J. McGinnies, W.G. Hassell, and C.H. Wasser; 1983; Colo. Agric. Expt. Sta. Special Series 21; 283 p. (Agric. Pub., Colo. State Univ., Fort Collins, Colo. 80521) Makes available the long-term results of many range seeding trials in Colorado; gives special emphasis to species establishment and persistence on particular sites; replaces Colo. Agric. Expt. Sta. Tech. Bul. 73.

**Summer and Fall Diets of Blacktailed Jackrabbits on Semidesert Rangeland;** by Sira-Mady Dabo, Rex D. Pieper, Reldon F. Beck, and G. Morris Southward; 1982; N. Mex. Agric. Expt. Sta. Res. Rep. 476; 20 p. (N. Mex. Agric. Expt. Sta., N. Mex. State Univ., Las Cruces, N. Mex. 88003) Compares botanical composition of blacktailed jackrabbit diets from different vegetational types.

**Threadleaf Groundsel and Forage Response to Herbicides in the Davis Mountains;** by R.D. Jones, D.N. Ueckert, J.T. Nelson, and J.R. Cox; 1982; Tex. Agric. Expt. Sta. Bul. 1422; 9 p. (Texas Agric. Expt. Sta., Texas A&M Univ., College Station, Tex. 77843) Evaluated herbicidal treatments applied at different seasons for consistent and extended control of threadleaf groundsel.

**Trace Element Deficiency Effects on Reproductive Function in Beef Cattle: A Review;** by P.G. Lemieux and D.B. Herd; 1982; Tex. Agric. Expt. Sta. Prog. Rep. 3924; 5 p. (Texas Agric. Expt. Sta., Texas A&M Univ., College Station, Tex. 77843) Reviews the effects of trace mineral deficiencies and their occurrence and recommends trace mineral levels for proper reproduction.

**Understory-Overstory Vegetation Relationships: An Annotated Bibliography;** by Peter F. Ffolliott and Warren P. Clary; 1982; USDA, For. Serv. Gen. Tech. Rep. INT-136; 39 p. (Intermtn. For. & Range Expt. Sta., 507 - 25th St., Ogden, Utah 84401) Describes understory production, density, or composition associated with specific overstories and conversions or modifications of overstories; covers 1972-1979 bibliography.

**The U.S. Sheep Industry: Changes and Challenges;** by C.F. Parker and A.L. Pope; 1983; J. Anim. Sci. 57(Suppl. 2):75-99. (U.S. Sheep Expt. Sta., Dubois, Ida. 83423) provides an interpretative overview of changes and progress occurring within the sheep industry during the past 25 years and projects future needs and developments.

# Legislative Log

As the 98th Congress recessed in early August, they were behind schedule on many items such as the appropriations bills. They were expected to act on some appropriations bills soon after convening on September 12. Forecasts are that the Interior and Related agencies appropriations bill will be sent to the President some time in September. The same may be true for the agriculture appropriations bill although there are still some questions to be resolved.

A few of the more important issues are briefly summarized as follows:

*Sale of National Forest Lands*

The Conference Report on the 1983 Supplemental Appropriations Bill, which was signed by the President on July 30, contained restrictive language concerning activities on land sales. The conference report said it is the sense of the Congress that it is not in the national interest to grant the authority to sell significant National Forest System lands until the Forest Serive specifically identifies the tracts that are no longer needed by the federal government, inventories the tracts for their public values, provides opportunities for public review and discussion of the tracts, and completes all necessary environmental assessments of such sales.

*Wild Horse and Burro Act Amendments*

Although there is much support for the Amendments to this 1971 act as outlined in S-457 by Senator McClure and others and in H.R. 1675 by Congressman Bolkman, some questions still have not been resolved. There is still time for passage yet this session if these questions can be resolved.

S-663 and H.R. 1675 commonly known as the Sodbuster Bills, still have not been acted on and a schedule for them has not been determined. Hopefully, there will be action yet this session. There are likely to be clarifying amendments to the original bill.

*States Oppose Bureau of Land Management Program*

Fish and Wildlife agencies from 13 western states have gone on record in opposition to the BLM's Cooperative Management Agreements Program (CMA'P), the Wildlife Management Institute reports. The agencies said among other things that the CMA, as proposed does not consider wildlife adequately.

*Clean Water Act Reauthorization*

The Senate Environment Committee voted unanimously to approve Senator Chafee's (R. of Rhode Island) amended Clean Water Act reauthorization bill S 431. There are still some problems with non-point pollutions. Full Senate action is expected in September.

*Clean Air Act*

The Administration is reported to favor some lessening of controls. This is in contrast to environmentalists' concerns over acid rain, auto emissions, and other air pollution problems. Hence a deadlock continues. Some people believe this will continue until 1985.

*Workshop on Payment in Kind (PIK) Program*

The Senate Subcommittee on Conservation, Forestry, and Environment, chaired by Senator Roger Jepsen of Iowa, held an informational workshop on September 1st. This workshop was arranged to provide a forum for discussion of the 1983 set-aside and plans for a 1984 program. SRM was represented.

Due to the extended drouth, plans for 1984 are being deferred until about November 1st.

The Conservation Wildlife Advisory Council met in a working session after the PIK discussion. They are asking that a conservation element be included as a direct requirement for participation in a land set-aside.

*Congressional Schedule*

As Congress convened on September 12th, after the summer recess, there was much concern over foreign relations. Some people believe that this may take a large portion of Congressional time. Earlier in the year the schedule was to adjourn around the middle of October. Now there are forecasts for as late as mid November. Usual business is being pushed aside for world wide issues.

# President's Notes

During the past few months I have had the opportunity to meet with a number of livestock operators, public land managers, and other range specialists. During these interactions we have discussed both problems and opportunities on the range. Several points keep emerging as challenges to the Society for Range Management. I'm listing these as priorities for attention by the SRM Sections:

(1) *The universities are turning out range scientists with a good theoretical background but with little or no practical experience.* As more and more students move into range programs from urban areas, this deficiency becomes more apparent. Agencies, colleges, and livestock operators must work together to design co-op and field work experience programs as a requirement for the degree. Can we respond?

A corollary to this problem is *the need for continuing education* for everyone. More short courses, more field tours, more interaction between the professionals and the land users is essential. Do we have plans to keep abreast of the changing knowledge base in range technology?

(2) *There is confusion between "Range Condition" – a measure of plant succession or regression – and "Range Trend" – an indication of improvement or deterioration.* It is confusing to release data to the public stating the number of acres in "poor," "fair" or "good" condition, without indicating whether or not the trend is up or down. There is ample evidence that the bulk of the rangelands have improved substantially since the 1930's and 40's. However, ranchers are still being condemned by many "environmentalists" because all ranges are not in good or excellent condition. Can we help to prevent confusion or misuse of data base?

(3) *We have continuing communication problems – particularly between the range professionals and user groups.* Part of this is related to terminology and confusion over the meaning of scientific expressions. Perhaps we are assuming too much in our presentations. One solution is certainly more emphasis on field tours.

(4) *Range Management and livestock production still suffer from the lack of adequate economic analysis.* It is difficult to assign dollar amounts to the resource base, conservation practices, and intangible land values. We have made good progress in recent years in range economics, but much remains to be done.

(5) *Ranchers, public land managers, and even research scientists are gradually losing the "tools" for manipulating vegetation.* This is a result of State and Federal regulations, pressure from environmental groups and other special interests. I refer specifically to restrictions on brush and weed control, insecticides, predator control, certain range improvements, and livestock manipulation. Since vegetation is the key to productivity and environmental stability, it is important that we continue to emphasize that the local managers need to retain the flexibility and the opportunity to use all of the important range improvement techniques.

The South Dakota Team has a good program lined up for Rapid City from February 12-17. *Make your plans now to attend.*—**Gerald Thomas,** President, SRM

# The Executive Vice - President Report

**Like the lowly milk stool** SRM needs a third leg to stand firmly on the ground. In addition to exposure and involvement we need strong support from our membership. In my travels to the various Sections to introduce myself, I have witnessed many examples of great support. We are not a large outfit in numbers, but it's obvious we're loyal. This is the impression I have gained and other organizations look at us enviously and are quick to say so.

This raises a serious question: Why is our membership always about the same? I feel there are many answers, ranging from simply being content to the mistaken image that we are an ivory-towered group dedicated only to ourselves. Frankly, these impressions are wrong. We have a wide variety of services to offer people in every facet of society. What is needed is for our members to speak up. When we write or speak, let's always make sure that it is understood that we are members of SRM and darn proud of it. Then let's go one step farther. While we're being proud, let's take the time to sign up a new member. Just think—if we all performed that simple task our membership would double, our financial position would be stable, and we would be in a much stronger position to represent the Rangelands. Please give it a try. It's really not hard. Why, you might even get carried away and sign up two.

**I believe the circle you have asked** me to ride gets wider everyday—and more interesting if that's possible. My travels have taken me from Arizona and Montana to Mississippi and Washington, D.C. I have attended four Section meetings, the BLM National Advisory Council, the joint meeting of the Experimental Stewardship Areas, the NACD Southwestern Regional Conference, and of course our Summer Board Meeting in Gulf Port, Miss., which was a real success. In addition I participated in meetings of the Grazing Land Forum and the Meat Associations and Socities Conference, where common concerns related to rangelands and range management were given high priority. When you add all that to the National Public Lands Council meeting in Denver and my share of work at the office, I have found very little spare time. But like the cowboy on roundup when the cook put in too much salt, it's just the way I like it.

**Incidentally, speaking of cowboys,** I had the privilege of working with the new awards program of the National Cattlemen's Association. There are two awards that are tailor-made for SRM members. It wouldn't hurt to look over the material in this issue of *Rangelands* that explains the details. I would be very proud if one or two of our members were the first recipients.

**In an honest effort** to keep the column as short as possible, I'm going to stop right here. I would much rather visit with our members personally or by phone. If I am on the trail, just leave word where to call and I will be in touch as soon as possible.

Again, it's a real privilege to be your Executive Vice-President. Be patient, we're making good progress.—**Peter V. Jackson,** Executive Vice-President, SRM

# Notes from Denver

**Elections**

Candidates for office of 2nd Vice-President are F.E. (Fee) Busby and Grant Harris. Candidates for office of director are Dick Whetsell, John Hunter, Gary Westmoreland, and Art Armbrust. Your vote will be an indication of your concern for how the Society is governed. This is a good slate to choose from, with representation from several sectors. Return your ballot, TODAY.....

**Meetings**

November and December will be busy months for Section meetings. The California Section will meet at the University of California, Davis, on November 4-6; Nebraska Section will meet in North Platte, Nebr., on November 4-5; International Mountain Section, November 6, Lethbridge, Alberta, Canada; Colorado Section will have a joint meeting with the Colorado Association of Soil Conservation Districts (CASCD) in Vail, Colo., on November 17-18 at the Marriott Hotel; Wyoming will meet at the Holiday Inn on November 18-19 in Douglas, Wyo.

Pacific Northwest Section will have their Annual Meeting on November 20-22 in Newport, Ore.; New Mexico will meet December 1-2 in Albuquerque; Texas Section will meet in Midland, Tex. on December 1-3, Dr. Gerald Thomas will be the keynote speaker for this Winter Meeting; Idaho and Nevada will have a joint meeting on December 8-11 in Jackpot Nev.; Mexico Section will meet December 10-12, Saltillo, Mexico.

The Society traveling display will be in Kansas City, Mo., for the 1983 National Agricultural Career Show, 56th National Future Farmers of America Convention, on November 9-11. The Society was presented a certificate for 5 years of participation in the Future Farmers of America Agricultural Career Show, last November 1982. Society participation in this convention is one of our ways of promoting rangelands and providing the participants an opportunity to learn about the Society for Range Management.

**Staff Changes**

We hated to see Cheryl leave the Society after such a short time; however, we have a new a very capable Staff Secretary—Carolyn Ohman. Carolyn and her husband Maurice have six children, Julie, Timothy, Andrew, Laurie, Sharolyn, and Howie. These are mostly grown children and I didn't want to take time to go into the spouses names and grandchildren. I will at a later time. I had a two-week vacation in September, and spent part of that time in Little Rock with my mother, who was hospitalized. Patti Willems had surgery in August and is feeling much better now. Julie and Audrey were busy in September mailing ballots and 1984 dues notices. The busy time of year is upon all of us. . .—**Jan Duck,** Administrative Assistant, SRM

# Summary of the Meeting of the Board of Directors

Following is a brief description of actions taken and assignments made by the Board of Directors (BOD) at the Meeting in Long Beach, Miss., July 18-20, 1983.

Minutes of the Long Beach summer meeting of the BOD are unofficial and unapproved.

- Minutes of the 1983 February BOD meeting were accepted and approved.
- An award for Teaching excellence will be presented by the Range Science Education Council (RSEC) during the Annual Meeting awards presentation.
- 1986 Annual Meeting will be held in Orlando, Florida, sponsored soley by the Society for Range Management.
- The Membership Committee will establish a Member of the Month Club or President's Club.
- The Range Inventory Standardization Committee (RISC) report will be referred back to the Committee to be edited before final form is printed.
- The Employment Affairs Committee will be reinstated into the Committee structure of the Society.
- Executive Vice-President Peter Jackson will be active and participate in Grazing Lands Forum and will serve on committees as assigned.
- The Society will not offer a subscription to annual bound volumes of the journals at this time.
- The membership/journal option will not be offered at this time.
- A by-laws amendment will be placed on the Ballot to add a membership category for industry.
- Increase in JRM page charges was approved. Increase of reprint charges by 30% was approved.
- An expression of thanks was given to the Southern Section for an outstanding job of hosting the Summer meeting.

# Condensed Minutes from the Advisory Council Meetings

**Long Beach, Mississippi, July 18-20, 1983**

All items outlined were approved by the Advisory Council and taken to the Board of Directors. Unless otherwise noted, they were accepted by the Board officially or approved for implementation if no formal motion was required. The last group of items were discussed by the A.C. but were not presented to the Board.

**MEMBERSHIP ITEMS**

1. An awards program was approved to recognize membership recruitment by Sections, individuals and student chapters or clubs (this was published on page 184 of August 1983 issue of *Rangelands*).
2. A proposal that the membership committee have a chairman and chairman-elect with members to be membership committee chairman of each Section will be discussed during January Board of Directors retreat.
3. Delinquent members will be automatically billed for several years after they have been suspended.
4. The possibility of establishing WATS lines in Denver office will be studied.
5. The membership certificate with spaces for the yearly membership stickers is reinstated. The A.C. reemphasized the desire from the Sections to reinstate the certificates.

**MEETING SITES**

The 1988 Annual Meeting will be held in Corpus Christi, Texas. The tentative dates for the meeting are February 15-19, 1988. The 1986 Summer Meeting will be held in Jackson Hole, Wyo., on July 20-24.

**MEETING DATES**

Because of some discussion during the Annual Meeting at Albuquerque about changing Annual Meeting dates to the latter part of February or early March, the A.C. recommended that Annual Meetings continue to be held during second or third week of February. This is a policy item that will require more information before a decision is made by the Board. The Sections that host the SRM Summer Meeting have some leeway in selection of meeting dates. However, the host Section should inform the Denver office of meeting dates as soon as possible.

**OTHER**

1. The number of institutional subscriptions to *Rangelands* is very low. Efforts will be made to increase the number of institutional subscribers. A special institutional library rate will be considered after more information is obtained.
2. A list of jewelry, awards and other items available for sale from Sections will be compiled and published.
3. A resolution presented by the Pacific Northwest Section on off-road vehicle advertising was referred to Public Affairs Committee to take action.
4. The Sections and individual members are encouraged to support passage of House equivalent of Armstrong Bill on plowout of rangelands.
5. A proposal for Range Plant Identification Team coaches to form a standing commitee was referred to the Student Affairs Committee.

**ITEMS NOT PRESENTED TO THE BOARD**

1. An I and E Committee Workshop will be held during the Annual Meeting at Rapid City. It will be a one-half day concurrent session. The Sections are encouraged to participate in the Workshop.
2. The Grazing Lands Forum established at a Winrock International Meeting in June, 1983, is a viable concept that should be supported by the Sections.
3. Only three Sections have provided a copy of their officers and committees handbook to the A.C. chairman. Other Sections should send a copy to Bill Laycock. The handbooks will be displayed during the Annual Meeting in Rapid City.
4. An ad hoc committee was formed to develop resolution and/or position paper on herbicide use.—**Bill Laycock**-Chairman, **Tommy G. Welch**-Chairman-elect

# Stickers and Receipts

Soon you will be receiving your 1984 dues notice, and membership card. Enclosed with them will be a 1984 sticker to be placed on your membership certificate. If you were a member between 1980 and 1983 and desire stickers for those years, please specify year, and send requests to Audrey A. Stepp at the Denver office.

If a receipt is needed for dues paid for 1984, please indicate on the white slip when paying your dues, and a receipt will be forwarded as soon as possible.

Thank you for your cooperation in these matters.—**Audrey A. Stepp,** membership supervisor.

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**TWO WILDLIFE FACULTY POSITIONS**

Assistant/Associate Professor of Wildlife Management: The Department of Range and Wildlife Management at Texas Tech University seeks to fill two teaching/research positions. One position will be filled on **January 1, 1984,** and other position will be filled on **July 15, 1984.** Teaching responsibilities for each position will include some combination of Big Game Ecology, Upland Game Ecology, Wildlife Techniques, Wildlife Population and Dynamics, Wildlife Physiological Ecology, and Introductory Wildlife. Please indicate your strengths and preferences in a resume. Each faculty member will have 3 or 4 courses to teach per year. A diversity of research interests and backgrounds adaptable to West Texas will be considered. Send resume, transcripts, and a statement of teaching and research interests, and three letters of reference to: Dr. Henry A. Wright, Chairperson, Department of Range and Wildlife Management, P.O. Box 4169, Texas Tech University, Lubbock, Texas 79409. Review of applications for the January position will be December 1, 1983 and review of applications for the July position will be April 1, 1984. Texas Tech University is an affirmative action/equal opportunity employer.

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**WANTED—JRM** 1(2,3,4), 30(3,4), 31(1,2,3,4,6), 33(1,2). *G. Long, 217 Hugh Thomas, Panama City, Fl 32404.*

# Candidates for SRM Offices

## Candidates for Second Vice President

**Fee Busby**

**Division of Range Management**
**College of Agriculture**
**University of Wyoming**
**Laramie, WY 82071**

*Born:* Brownfield, Texas, 1945

*Educational Training:* B.S., Agricultural Education, Texas Tech University 1969; M.S., Range Management, Texas Tech University, 1970; Ph.D., Range Watershed Management, Utah State University; 1977.

*Occupation/Employment: Current:* Professor and Head, Division of Range Management, College of Agriculture, University of Wyoming; Laramie. *Previous:* Assistant-associate professor and Extension range management specialist, Department of Range Science, College of Natural Resources, Utah State University.

*Activities in SRM: Section Activities:* Newsletter Editor (1973-1976), Chapter Chairman (1976); Youth Range Camp Chairman (1973-1978); and Range Man of the Year (1978) of the Utah Section. Range Camp Chairman (1980-81); President (1982) and Awards Chairman (1983) of the Wyoming Section. *Society Activities:* Helped establish the University Student Conclave (1970); Public Affairs Committee (1975-1977, Chairman of Committee in 1977); Annual Meeting Program Chairman (1979); Member of the Board of Directors (1980-1982); and Planning Committee (appointed 1983). Attended all annual meetings since 1968 and all summer meetings since 1974.

*Membership/Activities in Other Organizations:* Toastmasters Inter-national, Executive Secretary of Utah's Rangeland Development Committee (1974-1978); and Wyoming's Rangeland Use and Management Coordinating Committee (1981-present).

**Statement of Fee Busby:**

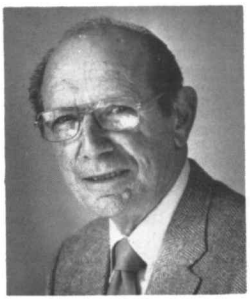
It was a compliment to be asked by a member of the Nominations Committee if I would consider running for the office of Second Vice President. To be nominated by the Committee and for this nomination to be approved by the Board of Directors was a pleasant surprise. The possibility of being elected and having the opportunity to serve our Society in 1986-87 as President is nothing less than sobering. It has been a humbling experience to sit down and write this statement explaining my thoughts about the SRM and what I would hope to help the Society accomplish should you elect me to this office.

I learned at least two very important things during my 1980-82 service as an SRM Board member: (1) The SRM is an organization that represents a diverse membership. Change must be made in a deliberate manner so that all segments and interests of our membership are considered. *But change we must because the world around us is changing.* Opportunities may periodically occur which will allow us to take giant steps forward, but we cannot wait for such opportunities to occur. Rather we must constantly take small steps that lead to positive growth of our individual members, the various interest groups that exist in the Society, the Sections, and the Society itself. (2) SRM's strengths are based on the individual members, interest groups, the Sections, and committees. We can be a strong, effective organization only if these strengths are harnessed so we can all pull together to accomplish common goals and objectives. The Board of Directors' primary responsibilities are to understand our strengths and develop both long and short-range objectives and programs of work that allow all aspects of our diverse membership to participate and contribute to the Society and profession.

These two realizations, plus my long-held conviction of the importance of rangelands to the well being of the world community, lead me to pledge that my efforts as President would be to continue organization of the Society in such a way that each member will have an opportunity to participate and contribute to the Society and profession. I use the word "continue" because our organizational structure has been moving in this direction for a number of years. A look at the SRM mini-directory which lists all Society officers, committee members, and Section officers will provide ample evidence of the number of members who are now involved in Society work. But many other members do not feel they have an opportunity to participate. The Society must continue to diversify its activities so that everyone who wants to be involved in Society work can be involved in work they want to do. The Society must also adequately define activities so those who have agreed to do a job know specifically what needs to be done and will know when the work is completed. Plans of work which do not define what, why, who and when usually lead to member frustration and loss of involvement which the Society cannot afford. Likewise, such plans of work often result in wasteful duplication of effort or assignments falling through the cracks and being done by anyone.

In my opinion, one mistake that our Society has been making is that many assignments which could be accomplished by members are routinely assigned to the Denver office. It is true that we have a professional staff in Denver, but the key to a successful volunteer organization such as SRM is member action and not staff action. Rather than routinely looking to the Denver office to do a job, we need to look for members who can and would like to do the job. Such a shift in approach would benefit everyone—the member who was given an opportunity to participate; the Denver office which can turn their attention from routine tasks to membership, Section, and external service; and the profession of range management which will be better served by a more active Society of Range Management.

Whether elected or not, I look forward to my personal involvement in the SRM. We are a good organization, but we are charged with a great responsibility; that is, influencing the proper use and management of the world's rangelands. Together it is a job that we can accomplish.



**Grant A. Harris**

**Department of Forestry and Range Management**
**Washington State University**
**Pullman Washington 99164**

*Born:* Logan, Utah 1914

*Education:* B.S. & Ph.D., Utah State University; M.S., University of Idaho

*Occupation:* Raised on a farm in Logan, Utah. Currently self employed; preparing Washington State Grazing Land Assessment for Governor; teaching; research into biohydraulic impact of Mt. St. Helens ash on range ecosystems; and Chairman of the Board, Decagon Devices Inc. (Ecological instrumentation).

Formerly, Chairman Department of Forestry and Range Management, W.S.U.; Project Leader, Range Research, U.S. Forest Service; Teaching, research, and Extension Range Specialist, Utah State; wildlife nutrition research, Utah Department of Game.

*Section Activities:* Charter member, PNW Section; Elected secretary, Board member, vice president, and President, PNW Section; Secretary Utah Section; Program Chairman PNW Section several years. Nominations, Awards, Youth Camp, research, curriculum review, publications, and many other PNW committees as Chairman and member, continuously; Program participant; range youth camp organizer, director, instructor; student chapter organizer and advisor.

*SRM Activities:* Charter member; Chairman Advisory Council; liaison from SRM to: AAAS, Society of American Foresters, Council of Forestry School Executives, Association of State College and University Research Organization; SAF RARE II Task Force, and others. Certification Panel; Awards Committee; Youth Activities Committee; Range Library Depository Committee; Range Plant Identification Contest initiator, Chairman, and committee member; Range Education Brochure; initiator of SRM Range Curriculum Accreditation program; SRM local arrangements chairman, Seattle, 1967; Range Civil Service Standards negotiator.

*Other:* SRM Fellow; AAAS Fellow; More than 50 scientific papers; Range Science Education Council secretary, vice president, and president; Sigma Xi; Xi Sigma Pi; active in church organizations; Silver Beaver BSA; Governor's Resource and Conservation Committees (several); U.S. Representative to Arid Lands Conference, Chile; Certified Range Consultant; Certified Senior Ecologist, Ecological Society.

**Statement by Grant A. Harris:**

The Society's youth activities are extremely important to the future of the range profession and the conservation of the world's rangelands. Our excellent program in this area must continue and improve.

Our great strength lies in grassroots support from active Section and Chapter units. Our administrative structure should be further evolved to encourage and develop stronger local units.

We have an enviable record of accomplishments, including the high standards of publications such as the *Journal*, and *Rangelands*, as well as numerous highly useful books and bulletins by our scientific committees. An additional immediate objective should be to capitalize on these resources to gain more visibility and credibility for our practical knowledge and wisdom. It is imperative that we be heard more effectively where critical decisions are being made. We must work more closely with related resource conservation organizations to achieve common goals through united programs.

We have played a significant role in solving national and international problems relating to resource conservation and world hunger. We can increase our effectiveness in this area by recruiting high quality individuals into the profession, both locally and internationally. Skills in communication and administration are especially needed in future professionals.

Despite the significant accumulation of range management knowledge through past research programs, there remains a serious backlog of required management information. Range research programs have been neglected and under-funded for several decades, in comparison to related agricultural research programs. The influence of the SRM should be directed to acquire more adequate and appropriate support for range research programs.

The Society has recently taken firm steps to strengthen the professional stature of future range managers. University programs are being upgraded through our accreditation process, standards for Civil Service qualifications have been upgraded, and rigorous standards for certifying individual professional consultants are in place. These safeguards of professional performance must be further developed and perfected through future study and discussion.

# Candidates for Directors

**Arthur J. Armbrust**
**1016 Kingsley,**
**Scott City, Kansas 67871**

*Born:* Ellsworth, Kansas, 1936

*Educational Training:* Kansas State University, BS Technical Agronomy and Animal Husbandry, 1957 Alexander Hamilton Business Course.

*Occupation/Employment: Current* Sharp Bros. Seed Co., Healy, Kansas 1972-Present; *Previous:* Rudy-Patrick Seed Co. 1959-1972.

*Activities in SRM:* Numerous committees K-O Section; President K-O Section 1980-81; Vice-Chairman Advisory Council 1981, Chairman 1982; Finance Committee 1980-82; Tulsa Meeting Advertising Committee, 1980; Membership Chairman, 1983; Have not missed a Section or Annual Meeting of SRM since joining in 1972.

*Membership/Activities in Other Organizations:* President, Kansas Seed Dealers 1973-74, Chairman Conservation Committee, American Seed Trade Assoc. 1973-1976, Chairman Farm Seed Division, American Seed Trade Assoc., 1979, Board of Directors, American Seed Trade Assoc., 1982, 1983, Central Regional Vice-president, ASTA, 1983-1985.

**Statement of Art Armbrust:**

The Society for Range Management is recognized by its members and those acquainted with it as the principal organization to provide leadership and expertise in the management of the range resource. Our challenge is to increase the membership of our SRM and acquaint more people with this organization and the principles of sound ecosystem management. We must also relate range research and practical information in economic terms so that land managers are able to relate sound management principles in some measurable way.

Our society should integrate some committee functions more closely with the Sections so that more effective action and communication are in effect to further the activities of SRM. At the same time, we must maintain the individual identity and uniqueness of the individual Sections.

*JRM* has been upgraded and enlarged and this program must continue. *Rangelands* must continue to be a very effective communications tool. Our Society's financial condition has been totally turned around and we are sound. This must continue.

SRM must stress our student programs, for these young people are the members and leaders of the future.

Never before has the challenge been greater to SRM. We must be politically active to be sure our needs and interests are heard. Only through SRM can our collective efforts and voices continue to stress the importance of the art and science of range management to all the people who will benefit from the wise use of this most important resource.

**John R. Hunter**
**Department of Range and Wildlife Management**
**Texas Tech University**
**Lubbock, Texas 79409**

*Born:* Roaring Springs, Texas, 1928.

*Education:* B.S. from Midwestern University and M.S. from Texas Tech

*Positions:* Associate professor of ra and wildlife management at Texas Tech University since 1958; for 23 years has operated an insect scouting service during summer months.

*Section Activities:* President of Texas Section in 1976, chaired and served on numerous committees, and attended all annual meetings since 1958.

*SRM Activities:* Served on Range Science Education Council and Membership, Finance, Audit, Office Operations, and Executive Secretary Selection committees.

*Other:* Soil Conservation Society of America, CAST, Texas Cattle Feeders, National Catlemans Association, Wildlife Society, TACT, Gamma Sigma Delta; maintained and helped establish Nature Trail for Girl and Boy Scouts; helped organize and promote Agricultural Science Blood Drives; donated and helped establish scholarship endowment funds in range and wildlife management; selected as one of Texas Tech faculty members to receive the President's Award for Excellence in Teaching with honorarium; selected by Lubbock County Soil and Water Conservation District Board of Supervisors as Conservation Teacher of the Year; and named Outstanding Teacher at Texas Tech University by the Collegiate Chapter of the Future Farmers of America; selected as the outstanding teacher in the College of Agricultural Sciences for the spring semester 1983.

**Statement by John Hunter:**

The future of range management will be greatly influenced by the Society for Range Management. Our Society must represent range management throughout the world. We have the opportunity and responsibility for promoting good range management.

Our Society needs to grow in International stature and aggressively influence public policy. As individuals we need to continue to recruit new members, especially ranchers. We all play important roles but the ranchers are the ones who ultimately determine the management and use of most of our rangeland.

The Society must stay involved in current issues and speak for our profession at all levels. If we do not represent range management, the decisions will be made by people who are not well qualified to speak for our profession.

Even though progress seems slow, we are moving forward. As a teacher, I have watched students who graduated 10 to 20 years ago assume management of ranches and initiate proper grazing management. Within a few years the stocking rate was increased and the range condition was greatly improved.

On my own place, I have practiced what I have preached for 20 years and the results have made me a better teacher and a stronger supporter of good rangeland management.

We are a relatively young Society and inflation has created some financial problems. As Chairman of the Finance Committee, I have had an opportunity to help address this problem. I believe the Endowment Fund will help solve our long range financial problems. We are operating on a sound financial basis and we are making progress. As a Director I would be especially interested in continued efforts to keep the Society on a sound financial footing.

I want to continue to be involved in the Society for Range Management and to serve in any capacity that will further its objectives. If we are to achieve our objectives, we must be dedicated, loyal and willing to work.

**Gary K. Westmoreland**
**Route 1, Box 3-B, Thompson Road**
**Troy, TX 76579**

*Born:* Meridian, Texas, 1944

*Educational Training:* BS, Range Science 1966, Texas A&M University; M.P.A., Public Administration 1977, Syracuse University; Graduate study in Range Science, 1966, Utah State University; Ecosystem Management Short Courses, 1974, Colorado State University.

*Occupation/Employment: Current:* State Resource Conservationist, USDA-SCS, Temple, Texas-leadership for range, wildlife, and recreation for SCS programs in Texas.

*Previous:* State Resource Conservationist, USDA-SCS, Casper, Wyo; state range conservationist (SCS), Tex.; area and field office range conservationist (SCS), Texas; district conservationist (SCS), Texas; research assistant, Texas Agricultural Experiment Station; research assistant, Texas Forest Service; research assistant, Utah Agricultural Experiment Station.

*Activities in SRM:* Served as member of the Public Affairs Committee of SRM since 1974; chairman of SRM's Public Affairs Committee 1978, 1980, and co-chairman in 1981; served as a director of the Texas Section, SRM and has served on numerous committees in both the Texas and Wyoming Sections; has been a member of SRM for 22 years; SRM liaison to multi-association task force (Society for Range Management; National Association of Conservation Districts; National Cattlemen's Association; National Wool Growers; and Public Lands Council).

*Membership/Activities in Other Organizations:* Member of National Cattlemen's Association; Soil Conservation Society of America; National Association of Conservation Districts; National Wildlife Federation, Wildlife Society, and American Museum of Natural History; presently serving on National Cattlemen's Association Task Forces on 2,4,5-T, RPA, and RCA; member of Alpha Zeta National Agricultural Honor Fraternity; active in church and community programs.

**Statement by Gary K. Westmoreland:**

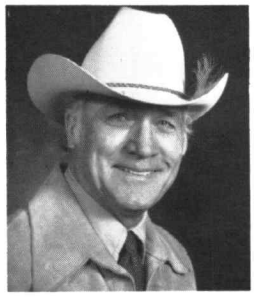
The Society has made tremendous stride in the past. I would hope to bring as your director, a persistence in our efforts to be recognized as the Nation's and the world's spokesman for range management.

The diversity of our membership and its expertise make SRM uniquely qualified to render assistance to those who own, operate, or manage rangeland and to those who pass laws, appropriate funds, or promulgate rules and regulations affecting range resource use and management.

Having served our Society as chairman or member of the Public Affairs Committee for the past 9 years has made me acutely aware of the need for SRM to carefully but deliberately make its positions known. Without the work done by our Society, range research stations would have been closed in large numbers, funds for research, education, technical and financial assistance would have been cut even more drastically than what they have, and the public awareness of the importance of rangeland to local, state, and national economics would have been only a dream. Yet while much has been accomplished, much remains to be done.

We need to continue to seek ways SRM can be of more effective service to our members outside of the United States. Moreover, there is a need for new sections in several nations of the world where rangeland is a major kind and use of land.

I firmly believe in and would actively support an accelerated educational effort by the Society. We need "to reach out and touch someone"—a lot of someones! Nowhere is this needed more than in the public-at-large. Special attention needs to be given to educating school children, urban residents, and legislators and policymakers at all levels of government. Only when people understand the "whys" of rangeland and range management can we expect for them to share the same enthusiasm and dedication that we in SRM have for this most vital natural resource.



**Dick Whetsell**
**Box 1209**
**Pawhuska, Oklahoma 74056**

*Born:* Comanche, Oklahoma, 1918

*Education:* B.S. Degree in Agronomy-Minor Animal Science, Oklahoma State University, 1941. Received USDA Scholarship for graduate work to Kansas State University.

*Occupation:* Since 1955 have been manager, president and now vice-chairman of the Board of Adams' Ranches and Oklahoma Land and Cattle Company with ranches in Oklahoma, Texas, New Mexico, Colorado, and Kansas. Served in Naval Air Corps-World War II and worked 13 years as range conservationist for SCS in Texas and Oklahoma. Born and raised on livestock farm in Oklahoma.

*SRM Activities:* Served as President (57-58) and Committee Chairman over the past years of the Kansas-Oklahoma Section. Almost charter member of SRM. Chairman of Producer Affairs for SRM in 1981. Have served on various SRM committees over the years. Received the Frederic G. Renner Award for SRM and the Trail Boss Award from the Kansas-Oklahoma Section, 1981.

*Other:* Presently serving as Chairman of Oklahoma Cattlemen's Association Rangeland Improvement and Research Committee, Chairman of Oklahoma State University Animal Science Advisory Committee and member of National Cattlemen's Association Research and Education Committee. Author of Phillips Petroleum Company's, "Range and Pasture Plants", color illustrated publication now in its 4th edition.

**Statement by Dick Whetsell:**

In 1948 the organization of "The American Society of Range Management" was started at a called meeting at Salt Lake City. L.A. Stoddart, B.W. Allred, F.P. Renner, Geo. Stewart, D.F. Castella, Vernon Young, Joe Pechanec, W.T. White, and Harold Heady were the early leaders. In 1970, the name was changed to *"The Society for Range Management".* I was not a charter member, but pretty close as I joined the group in 1949 or 1950. SRM has a solid scientific base which needs expanding as new findings permit. We also have a limited contact with livestock industry people "the rangeland users" that we must cultivate and add to in a more fruitful manner.

Just recently our President, Gerald Thomas, stated we must be sure that SRM is recognized as being "management orientated" not "protection orientated." Our members have the know-how in this field, and our livestock industry is in dire need of sound ways to increase production—so now is the perfect time to move effectively in this direction. This will require no doubt both new ideas and approaches as we concentrate on making SRM more visible to all the people as we do this. It would be good to have the support of many non-members in the livestock industry who recognize the role of SRM in total resource management.

SRM is valuable to me because it offers a combination of scientific know-how and its application to a renewable resource for production purposes. We must have sound basic research, attractive education and effective extension in order to encourage better rangeland management. No amount of technology researched and written up will have value unless it is applied to the range. Let our goal be the use of all we know in maintaining and improving our natural grazing lands.

For the past 40 years, I have been connected with range as a technician or ranch manager and it has been very rewarding. Oklahoma Land & Cattle for several years has worked with different universities on field days, schools, demonstrations and student internships. My company has agreed to give me time as needed and some expense money to be used in effectively implementing SRM's concept of being *"management orientated not protection orientated."* Let us all join together and *really* promote the art and science of grazing land management.

## Last Call for Questions for Undergraduate Range Management Exam for the 37th Annual SRM Meeting

Questions are now being solicited for the Undergraduate Range Management Exam to be administered at the 1984 Annual Meeting of the Society for Range Management in Rapid City. Four-option multiple choice questions (with one correct answer) may be submitted for the following subject categories listed in June *Rangelands.*

In addition, practical and scientific problems may be submitted for the grazing management, range improvements, and range inventory and analysis categories. University faculty members, government agency personnel, industry personnel and private ranchers are encouraged to submit questions and problems before December 15, 1983. There is no limit on the number of questions and problems submitted—the more the better. Please indicate correct answers to questions and include solutions to problems.

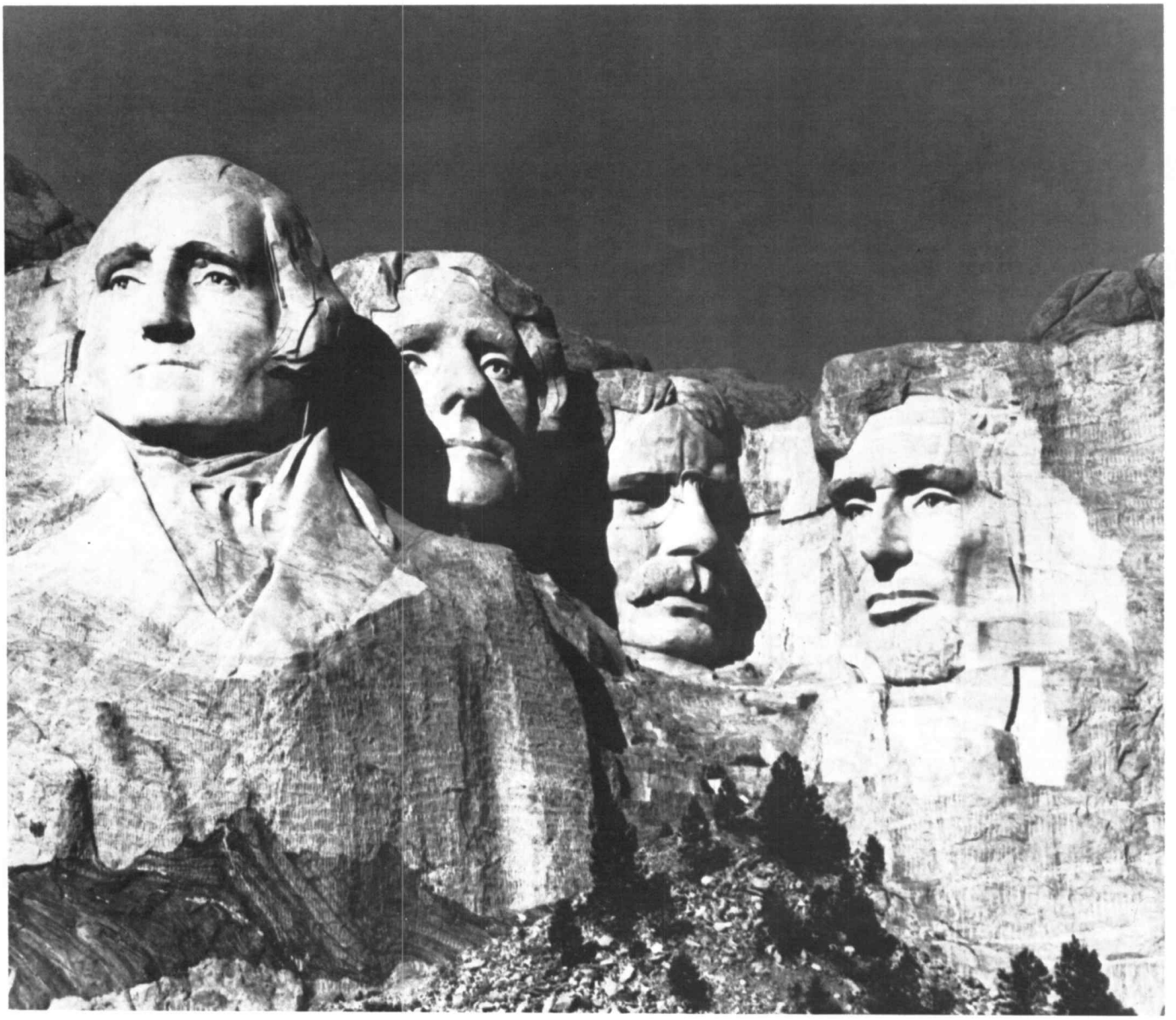
Send questions and problems for the Range Management Exam to: *C.A. Call, Department of Range Science, Texas A&M University, College Station, TX 77843.*

YOU ARE INVITED TO ATTEND THE

# 1984 ANNUAL MEETING OF THE SOCIETY FOR RANGE MANAGEMENT

IN RAPID CITY, SOUTH DAKOTA

FEBRUARY 12-17, 1984



MOUNT RUSHMORE NATIONAL MONUMENT
"SHRINE of DEMOCRACY"

# Rapid City, South Dakota—the Host City

At the foot of the Black Hills is Rapid City. Born in 1876, out of a campfire conversation by a group of prospectors, Rapid City formed its initial city plans. Two of the prospectors, John Brennan and Samuel Scott, along with a small party of men, laid out the site. A square mile was measured off and six blocks in the center were designated as the business section. The city was named for the spring-fed Rapid Creek which still flows through the town.

While only a town of less than 50,000, there are many attractions in Rapid City and it is the gateway to some of the country's most beautiful, historic and majestic sights, which attract thousands of tourists to the area every year. Rapid City is nestled at the foot of six thousand square miles of America's highest mountains east of the Rockies, and is within an easy day's drive of nine State and National Parks—the highest concentration of Parks in any area of the United States!

Agriculture is the number one industry in South Dakota and Rapid City is the regional farm and ranch trade center for the State as well as neighboring counties in Montana, Wyoming, and Nebraska. Today, the influence of the Old West is still seen in the people's casual attire of cowboy hats, jeans, and boots. Since its early settlement days, Rapid City has become a city with the fastest, steadiest growth in the State and is third in the Nation!

The weather in Rapid City is ever-changing, with four distinct seasons and moderate temperatures. Within minutes of the city, you can go from balmy sunshine to snowflakes in the higher elevations. Locally, Rapid City is known as the "banana belt" of the Northern Plains! Beginning in early December, downhill and cross-country skiing become favorite winter pastimes for many. Or, maybe you will want to bring your snowmobile and enjoy the 120 miles of trails in the Black Hills. Whatever your pleasure, in South Dakota, snow never closes us down. Come and enjoy this winter wonderland in the "Heart of the American Rangelands."

## Why An Annual Meeting?

The Society for Range Management is the broadest, most knowledgeable organization concerned with rangelands and their renewable resource products and values. Its purposes are: (1) to promote a more comprehensive understanding of rangelands and their use, (2) to provide information about range management principles and practices, and (3) to foster a public appreciation of the economic, social, and environmental benefits to be gained from intelligent range management. Each year SRM holds an international winter meeting to share rangeland knowledge and experiences. The 1984 Annual Meeting will be held in Rapid City, South Dakota, and is open to all interested persons. Please join us for a most enjoyable and educational experience.

## Rushmore Plaza Civic Center—SRM Annual Meeting Headquarters

Rushmore Plaza Civic Center, our Annual Meeting Convention Headquarters, is one of the finest convention facilities in the Midwest. It seats over 11,000 people making it the largest arena in South Dakota. The theater seats 1,774, plus there are dozens of meeting and banquet rooms and over 50,000 square feet of exhibit area. Ideal for our convention, Rushmore Plaza Civic Center on the banks of Rapid Creek, is within walking distance of many fine motels and restaurants.

## The Meeting Program

**Sunday, February 12**

- Many of the **committee meetings** will be held, and the day will conclude with a no-host **SRM Mixer.**

**Monday, February 13**

- The **first Plenary Session,** "Perspectives on the Heart of the American Rangelands," will focus on the characterization, historical development and human impacts on the "Heart of the American Rangelands."
- The **second Plenary Session,** "Politics and Rangelands," will focus on rangeland policy making.

**Tuesday, February 14**

- **Concurrent Sessions**
  A change this year is the incorporation of the **Vegetative Rehabilitation and Equipment Workshop (VREW)** into our concurrent sessions, plus a new session—**Ranchers' Forum**—which will feature ranchers and other ranch manager specialists speaking on the status of ranching in North America and new ranch practices.

**Tuesday evening**

- Don't miss the **President's Reception and Dance**

**Wednesday, February 15**

- **Concurrent Sessions,** including a new **Grazing Systems Symposium,** will continue until late afternoon, when the **SRM Annual Membership Business Meeting** and **Awards Ceremonies** will be held. The day will wind up with a fine buffalo feed at the **Annual Meeting Banquet.**

**Thursday, February 16**

- The **Concurrent Sessions** will continue, with two other new additions an **Information and Education Symposium,** focusing on the role of communciation in all our endeavors, and a **Range Improvement Economics Symposium.**

**Friday, February 17**

- Our **Post-Convention Tour** will visit near-by Wind Cave National Park, Custer State Park, and a local ranch. Be prepared to see buffalo, antelope, deer, and elk, along with some excellent rangelands.

# Lodging in Rapid City

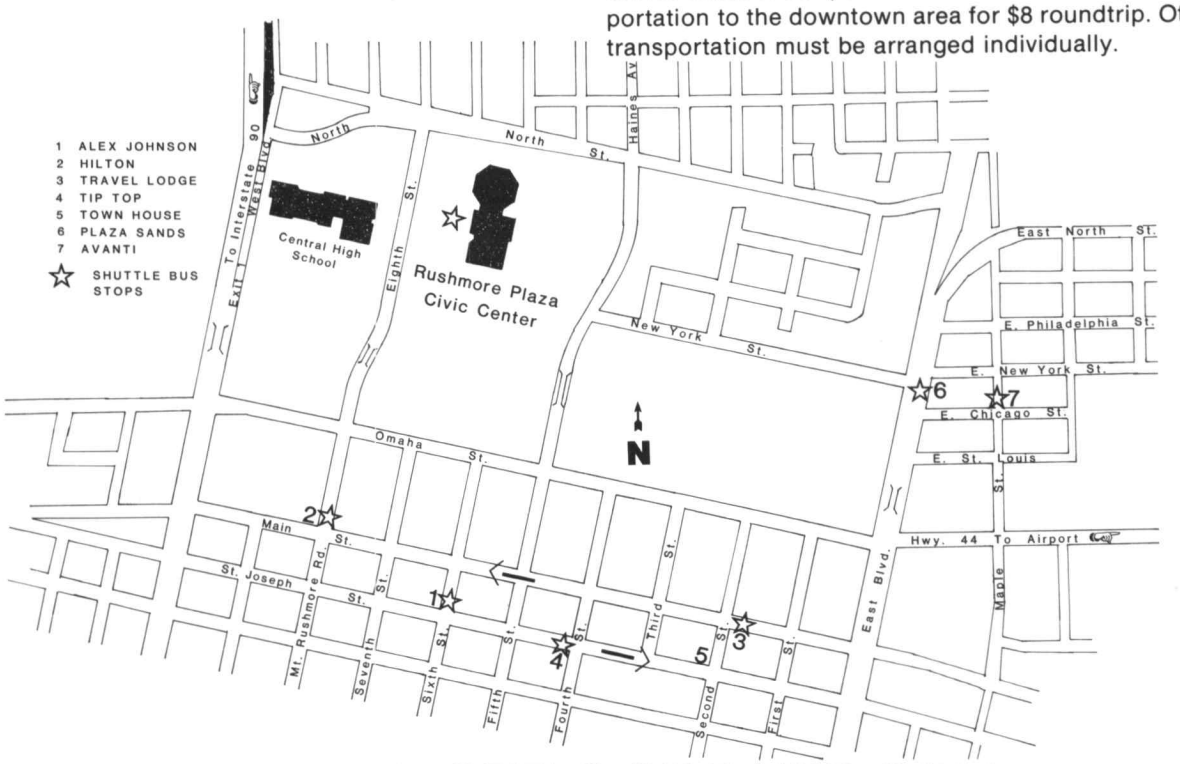
SRM has 525 rooms reserved for our Annual Meeting in 7 excellent hotels located near the Rushmore Plaza Civic Center, our convention headquarters. *Special Student housing* (at lower rates) has been reserved at the Avanti and Plaza Sands Motels. *Shuttle bus service* to and from the Civic Center will be provided free of charge to persons registered for the Meeting from the Alex Johnson Hotel, Hilton Inn, Tip Top Motor Hotel, Town House Motel, Travel Lodge, Avanti, and Plaza Sands Motel. Check the list and make your reservation early by calling or writing the hotel of your choice.

# Meals While at the Meeting

The few eating facilities that are close to the Civic Center are of insufficient size to handle a group as large as ours in a short time. Therefore, the 1984 Annual Meeting Committee **has contracted to have breakfasts and chuckwagon lunches catered in the arena of the Civic Center. The price will be reasonable, the food good, and the service fast.**

# Transportation

The Rapid City Regional Airport is approximately 7 miles east of town. The airport limousine service will provide transportation to the downtown area for $8 roundtrip. Otherwise transportation must be arranged individually.




# HOTELS/MOTELS OF RAPID CITY

| HOTEL/MOTEL | FACILITIES† | ADDRESS | PHONE (Area Code 605) | NO. OF UNITS | ROOM RATE** | DISTANCE FROM CIVIC CENTER |
|---|---|---|---|---|---|---|
| Hotels/Motels with reserved rooms and shuttle service: | | | | | | |
| Alex Johnson Hotel | R,L | 523 6th Street | 342-1210 | 122(100)* | $35.00 | 6 blocks |
| Hilton Inn | R,L | 445 Mt. Rushmore Rd. | 348-8300 | 177(125)* | $33.00 | 2 blocks |
| Tip Top Motor Hotel | R,L | 405 St. Joe | 343-3901 | 64(50)* | $24.50 | 6 blocks |
| Town House Motel | | 210 St. Joe | 342-8143 | 40(35)* | $20.00 | 6 blocks |
| Travel Lodge | R,L | 125 Main Street | 343-5435 | 156(130)* | $28.50 | 8 blocks |
| Motels with reserved rooms and shuttle service for student participants: | | | | | | |
| Avanti Motel | | 102 N. Maple | 348-1112 | (30)* | 4 people/room/$26.00<br>Single $18-$20 | |
| Plaza Sands Motel | P | 212 East Blvd. N. | 348-8232 | (55)* | 4 people/room/$32.00<br>Single $15.50 | |
| Other Motels: | | | | | | |
| Best Western Motel | P,R,L | 2505 Mt. Rushmore Rd. | 343-5383 | 100 | $20.00 | 1½ miles |
| Holiday Inn | P,R,L | I-90 at Exit 59 | 348-1230 | 167 | $32.00 | 2 miles |
| Howard Johnson's | P,R,L | I-90 & LaCrosse | 343-8550 | 240 | $34.00 | 2 miles |
| Ramada Inn | R,L | 2208 Mt. Rushmore Rd. | 342-1300 | 109 | $20.00 | 1 mile |
| Sands of the Black Hills | | 2401 Mt. Rushmore Rd. | 348-1453 | 72 | $20.40 | 1½ miles |
| Super 8 Lodge | | Mt. Rushmore & Cleveland | 342-4911 | 99 | $20.00 | 1½ miles |
| Super 8 Motel | | I-90 at Exit 59 | 348-8070 | 119 | $19.00 | 2 miles |

* Block of Rooms Reserved for SRM
**Room Rates are for One Person, One Room unless Otherwise Indicated
† R = Restaurant, L = Lounge, P = Pool

# Registration

For your convenience a pre-registration form is included below. Pre-registration will not only save you money, but it is a tremendous help to the annual meeting committee, allowing them to plan arrangements and events with a degree of certainty that will ensure a better meeting for all.

Please fill out the registration form and attached receipt and mail to Ardell Bjugstad. The receipt memo will be enclosed with your tickets in the registration package to be picked up when you arrive at the meeting. Remember, **registration before January 6, 1984, will save you $15 per person registered.**

In addition to completing your registration you must reserve your hotel accommodation. Call or write the hotel of your choice soon.

# Post-Convention Range Tour

This all-day bus tour of the scenic Black Hills and prairie of South Dakota will include a local ranch, Custer State Park, and Wind Cave National Park. Highlights will include explanation of range management practices by ranchers, tour guides, and park personnel. Two ways of achieving proper use of range in the Parks will be explained: trapping and removing elk in Wind Cave National Park and hunting and selling bison in Custer State Park. During the day, you will have the chance to see climax condition grasslands and how fire is ued to manage ponderosa pine savanna. You will also have the opportunity to tour one of the most outstanding underground caverns in this area. Be sure to bring your camera for this tour in the "Heart of the American Rangelands."

The tour will start at the Civic Center at 8:30 a.m., and the buses will return around 4:00 p.m. Lunch will be provided. Sign up for this tour when you register, $12.

# Social Events

The week's activities will kick off Sunday evening with a no-host *SRM Mixer* at the Civic Center. Tuesday evening you won't want to miss the *President's Reception and Dance.* Wednesday evening you'll have the chance to enjoy all the Baron of Buffalo you can eat, plus entrees, topped off with Dutch apple pie for only $12 at our *SRM Annual Meeting Banquet.*

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*SRM Business Activities* will get underway Sunday.

The *Advisory Council* will meet Sunday afternoon and Monday morning.

The *Board of Directors Meetings* are scheduled for Tuesday morning and Thursday afternoon. Most of the *SRM committee meetings* will be held Sunday afternoon and Monday.

The *SRM Press Room* and *Student Employment Office* will open early Monday morning and will continue operations throughout the week. The *Speaker Preparation Room* for reviewing audio-visual presentations will be open during the same hours.

Watch for the complete schedule of events in the December *Rangelands* and in the pre-meeting "Trail Boss News."

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SRM-Society for Range Management
1984 Annual Meeting
Rapid City, SD
Pre-registration Form

For reduced registration: Please send this form to be received not later than January 6, 1984 to:

Ardell J. Bjugstad
Chairperson of Registration
P.O. Box 4274
Rapid City, SD 57709

(Please print legibly—Use name wanted on name tag)

NAME: _____

ADDRESS: _____

_____

NAME OF SPOUSE (if attending):

Please complete the reverse side and enclose check or money order in the proper amount to SRM Annual Meeting (all amounts are in U.S. funds or equivalent). NO REFUNDS AFTER JANUARY 20, 1984. (ONLY BY WRITTEN CANCELLATION).

# Student Activities

In addition to the regular student events, this year some new events have been added. The South Dakota Section is sponsoring a *Free Luncheon* for all registered students. Plus, students will have a chance to speak with well-known range science professionals at the *Student/Professional Discussion Session.* Another bonus this year is that the Rushmore Plaza Civic Center has an exhibit area large enough for an *unlimited number of student displays,* so we urge each Student Chapter to promote their school. Let's set a student registration record in Rapid City!

# Special Events/City Tours

Come to Rapid City in 1984 for an exciting and entertaining time in the beautiful Black Hills.

**Monday afternoon**—"Color Your Home Beautiful"; Beginning at at 1:30, take this opportunity to work with professional Interior Decorators who will show you what color can do for your home and demonstrate new designs and trends in decorating. You will receive a copy of the "Ethan Allen Treasury," a book packed full of ideas on decorating with the "old" and "new" in furniture and design. $6.

**Tuesday**—*Mt. Rushmore Memorial/Crazy Horse Tour*:* Buses will leave the Civic Center at 8:30 a.m. for the beautiful and scenic trip through the Black Hills, stopping first at Mt. Rushmore National Memorial, a massive granite sculpture memorializing four American Presidents: George Washington, Thomas Jefferson, Abraham Lincoln and Theodore Roosevelt. Our next stop will be Crazy Horse Memorial, another great mountain sculpture which is now in progress. From there we'll go to Hill City to the unique and rustic "Chute Roosters" restaurant for lunch. $15.

*Additional tours to Mt. Rushmore Memorial are being planned. Sign up at the registration desk at the Annual Meeting.

**Wednesday**—*Cultural Tour:* You'll have a chance to visit the *Dahl Fine Arts Center* featuring a 200 foot mural recapping 200 years of American history, two art galleries, and a gift shop. Our next stop will be the *Museum of Geology at the* South Dakota School of Mines, for a view of outstanding exhibits of prehistorical vertebrates, invertebrates, plant life, rocks, minerals and ores. Then you won't want to miss the *"Chapel in the Hills,"* a replica of the famous 800 year old Stave church in Norway. At noon, we'll have lunch at the famous Alex Johnson Hotel, one of Rapid City's oldest, and finally a style show featuring Lavern Hides and her Indian Originals. The tour will begin at 9:30 a.m. and return by 2:30 p.m. $13.

**Thursday**—*Reclamation Tour:* At 8:00 a.m., board the bus for a three hour tour in the Rapid City area and see reclamation work after the devastating 1972 flood that destroyed the area of Rapid City along Rapid Creek. The floodway was established as an urban renewal project and has many uses: a native tall grass prairie was established as a quiet natural area; an arboretum is being established, and many parks, tennis courts, playing fields, and a golf course are maintained. Also, see excellent mine reclamation work at the Pete Lien Quarry where mined areas are covered with soil and seeded with grass to prevent erosion and air pollution. $5.

**Thursday**—*Ellsworth Air Force Base Tour:* We'll leave the Civic Center at 11:30 a.m. for a tour and lunch at the Ellsworth Air Force Base, which initially opened as training base for B-17 "Flying Fortress" crews, and is now important as a Strategic Air Command Base equipped with intercontinental B-52 stratofortress bombers. $13.

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SRM 1984 ANNUAL MEETING
REGISTRATION FORM

Name: _____

Address: _____

_____

REGISTRATION:

| | Pre-registration received before January 6, 1984 | Pre-registration received after January 6, 1984 | Number of People | Total Cost |
|---|---|---|---|---|
| Members | $35.00 | $50.00 | _____ | _____ |
| Student Members | $20.00 | $30.00 | _____ | _____ |
| Spouses | $15.00 | $20.00 | _____ | _____ |

TICKETS TO SPECIAL EVENTS:

| | Cost per Person | Number of People | Total Cost |
|---|---|---|---|
| MONDAY | | | |
| "Color Your Home Beautiful" Tour | $6.00 | _____ | _____ |
| TUESDAY | | | |
| Mt. Rushmore & Crazy Horse Tour | $15.00 | _____ | _____ |
| WEDNESDAY | | | |
| Cultural Tour | $13.00 | _____ | _____ |
| Annual Meeting Banquet* | $12.00 | _____ | _____ |
| THURSDAY | | | |
| Reclamation Tour | $ 5.00 | _____ | _____ |
| Ellsworth Air Force Base Tour | $13.00 | _____ | _____ |
| FRIDAY | | | |
| Post-Convention Range Tour | $12.00 | _____ | _____ |
| Total Amount Enclosed | | | _____ |

*Limited to 900 people

RECEIPT MEMO:
Please fill in your name and amount enclosed. Pick up at registration desk.

NAME: _____

PRE-REGISTRATION:

| | |
|---|---|
| Member | $ _____ |
| Student Member | $ _____ |
| Spouse | $ _____ |

TICKETS:

| | |
|---|---|
| "Color Your Home Beautiful" Tour | $ _____ |
| Mt. Rushmore/Crazy Horse Tour | $ _____ |
| Cultural Tour | $ _____ |
| Annual Meeting Banquet | $ _____ |
| Reclamation Tour | $ _____ |
| Ellsworth Air Force Base Tour | $ _____ |
| Post-Convention Range Tour | $ _____ |
| Amount Enclosed | $ _____ |

## Tentative Schedule for Concurrent Technical Sessions

**TUESDAY, FEBRUARY 14**

*Morning*

Vegetative Rehabilitation and Equipment Workshop (VREW)
**Ranchers' Forum**
Inventory and Monitoring
Range Wildlife

*Afternoon*

Vegetative Rehabilitation and Equipment Workshop (VREW)
Range Animal Nutrition
Range Ecosystem Planning
Range Improvement Practices
High School Student Forum Presentations

**WEDNESDAY, FEBRUARY 15**

*Morning*

Vegetative Rehabilitation and Equipment Workshop (VREW)
Grazing Systems Symposium
Inventory and Monitoring 1/2; Miscellaneous 1/2
Range Improvement Practices
University Student Conclave Presentations

*Afternoon*

Grazing Management
Succession
Hydrology
Special Use Pastures

**THURSDAY, FEBRUARY 16**

*Morning*

Range Improvement Economics Symposium
Grazing Management
Range Plant Autecology
Reclamation

*Afternoon*

Range Plant Communities
Range Improvement Practices
Information and Education Symposium
Grazing Management

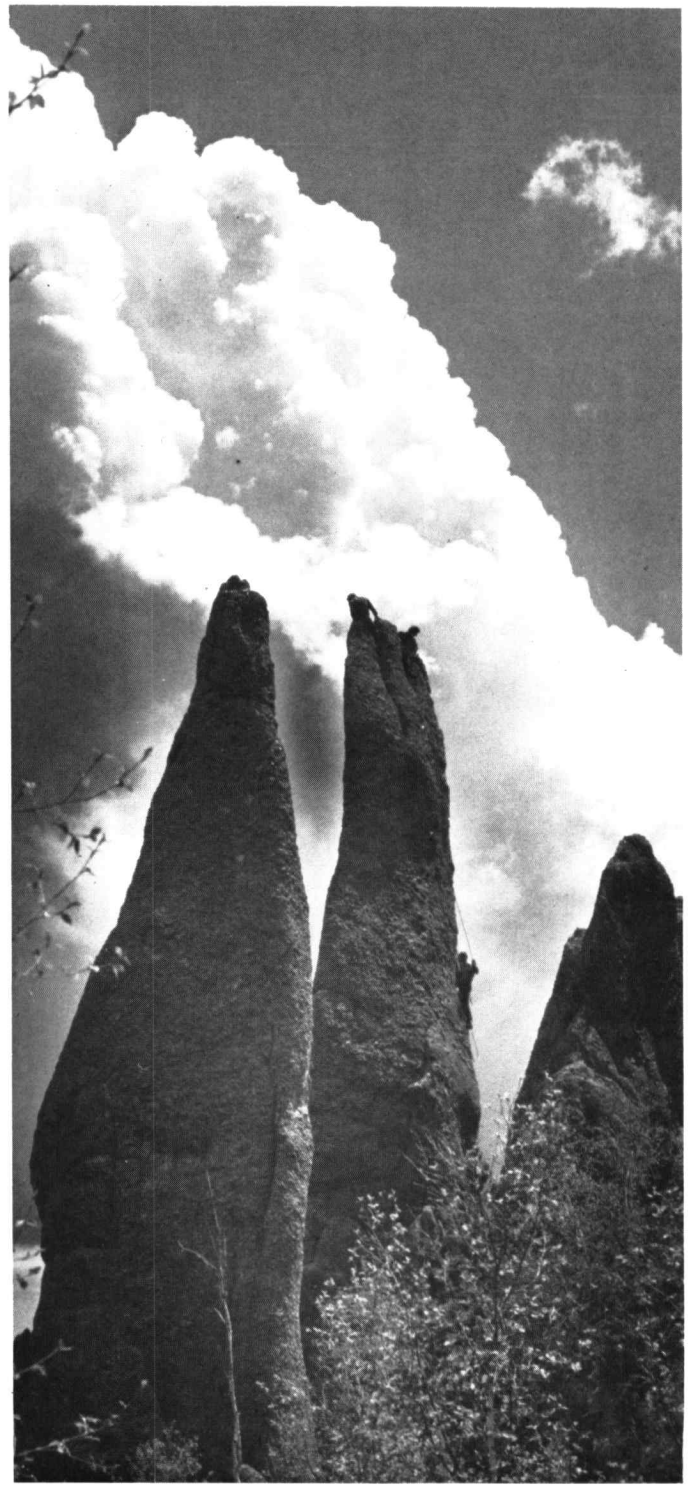
**POSTER SESSIONS:** Posters will be set up from 8:00 AM Tuesday through 5:00 PM Thursday.

**Persons interested in helping** with the SRM 1984 Annual Meeting in Rapid City, S. Dak., are encouraged to contact:

F. Robert Gartner or Jim Johnson
801 San Francisco St.
Rapid City, S. Dak. 57701
(605) 394-2236

or
Ed Anderson
PO Box 1040
Rapid City, S. Dak. 57709
(605) 394-3829

There is so much to see near Rapid City, S. Dak., during the SRM Annual Meeting February 12-17, 1984



Towering granite spires line a seven-mile stretch of South Dakota's famous Black Hills Needles Highway. (Photograph courtesy of S.D. Division of Tourism).

Rangelands
(ISSN 0190-0528)
2760 West Fifth Avenue, Denver, Colorado 80204
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Richard M. Hansen