short term loans by mid 1982. The present cost-price squeeze has become critical to ranch income. Low or negative returns to operator’s combined labor and management have been common since 1973 but critical during 1981 and 1982. Long-range improvements have given way to short-run survival on many ranches.

Summary

The benefits from range improvements are very broad. Thus, the constraints to the completion of such work must be dealt with directly rather than avoided. Part of the answer to the present dilemma may be found in the following conclusion by Achterman (1980), “Range scientists today have the scientific tools to improve the condition of public rangelands and the legal tools to achieve good results. What is needed now is bold use of these new tools rather than legalistic paperwork.” And the opportunities to improve privately owned rangelands are as great or greater.

Range Improvements—Getting Going Again

John F. Vallentine

Range improvement techniques in recent years have provided the basis of meeting the national consciousness for rehabilitating devastated sites, i.e. mine spoils, transportation rights-of-way, natural disasters, etc. After modification and intensification, they have admirably met these new needs but often after siphoning existing expertise, research, personnel, and equipment away from the development of the range forage base. Seemingly forgotten in this reclamation fever is that these special treatments, developments, and structures collectively referred to as range improvements were originally assembled and developed (1) to increase the quantity and quality of our range forage resources and (2) to facilitate their utilization by grazing animals.

Range improvements are not merely means of restoring or rehabilitating ranges in low condition but have application to top condition ranges also. Waterspraying, fertilization, herbicides and other pesticides, and the introduction of new forage species and cultivars provide the tools for increasing productivity beyond even pristine conditions. For some range ecosystems, climax falls short of the ultimate that can be obtained by applying range development expertise.

Range Improvement Needs

Higher priority must be given range improvement work if future needs are met for the livestock industry, game animal habitat, production of human food, stimulation of the national and local economy, and meeting basic stewardship responsibility over renewable natural resources.

The national FRES report (Forest-Range Environmental Study 1972) projected that the demand for livestock grazing from U.S. ranges would increase by 2000 A.D. from the 1970 base of 213 million AUM’s to 300 or perhaps 450 million. This report estimated that 317 million AUM’s could be achieved even by application of extensive methods by 2000 A.D., but 455 million was achievable by maximizing intensive methods while maintaining environmental standards. From the FRES report data the USDA Intergency Work Group on Range Production (1974) estimated a three-fold increase in red meat production from U.S. rangelands possible while simultaneously increasing other rangeland uses. However, when Congress rewrote the RPA (Resources Planning Act) statement in 1980, they stated that U.S. ranges should be improved to provide 310 million AUM’s of livestock grazing (De La Garza 1981). Even this reduced grazing capacity objective will require a return to former levels of range improvements.

Range improvements on individual ranches are a means of internal expansion in grazing enterprises, balancing seasonal forage needs, improving livestock gains, and meeting special needs. More and better game animal habitats can provide not only more hunting but landowner returns as well; returns of $1 to $5/acre annually have commonly been realized through game ranching in Texas. Increasing ranch incomes have expanded benefits since for every $1.00 thus generated the local economy experience $2.50 to $3.00 in added household incomes (Gray 1979). Expanded range

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(A companion paper entitled “Range Improvements—Getting Going Again” will explore the ongoing urgency for range improvements and possible ways of overcoming some of the present constraints.)
animal production carries with it an advantage of reduced use of fossil fuels and fertilizers required per unit of red meat produced. Each AUM or range capacity for livestock production releases 8 bushels of corn for human food production and an improved balance of trade for the U.S. And last but not least, range improvement including livestock grazing itself can be an important means of environmental enhancement and multiple use coordination when properly planned and managed.

The benefits from range improvement work are obviously broad based, and the constraints to the completion of such work must be dealt with directly rather than avoided. It is obvious that range scientists today have the scientific tools to improve the condition of both public and private rangelands, but this will require the bold use of these tools in breaking through the present constraints.

**Breaking through the Constraints**

Higher priority must be given to teaching range improvement principles and skills and providing more on-the-ground experience through university curricula, in-service training, and extension education. Putting the range science practicums back into their training becomes even more important as fewer range science students have farm or ranch backgrounds. Civil Service requirements now include courses both in range improvements and in grazing management. However, many skills will be perfected only through on-the-job training and practical experience after graduation. Agency in-service and extension continuing education programs must consider these needs.

The problem of training and updating agency personnel in range improvement techniques has been pointed out by Leavell (1980). “The experienced project work force of the fifties and sixties dwindled. The faces have changed at the field level in those jobs that carried out the range improvement program on the ground. We find today that only 24% of BLM’s present employees were with us in 1965 and only 22% of our range conservationists go back more than 10 years...I am convinced that many managers in the position to allocate funding for rangeland improvement through better or more equipment, better technology, or better plant materials are just not up to date as to what options are available to them... There is quite likely a great lack of experienced people in our field offices who are trained and ready and able to carry out an accelerated program of range improvement practices throughout the West.”

The Vegetative Rehabilitation & Equipment Workshop program has played a prominent role during the seventies in maintaining a nucleus of interest and expertise in range improvement work. Its efforts should be expanded to reach range technicians at the field level and administrators allocating funds. Expanded emphasis on range improvements could be given in range and ranch tours, experiment station field days, extension shortcourses, and many other ways.

An example of a highly effective range improvement workshop was held September 1981 at Twin Falls, Idaho, and coordinated by the Intermountain Forest & Range Experiment Station. This 3-day workshop combined classroom instruction and field trips to examine and be instructed in the field operation of range improvement equipment. The present interest in range improvement know-how by field personnel was exemplified in that the workshop had been conservatively planned for 250 people but 500 attended from the ranks of federal, state, and private industry and many more were turned away.

Technology transfer must play an ever greater role in locating, assembling, and distributing range improvement data. All too much technology is still locked up in files, books, reports, and heads of experienced technicians. Society for Range Management (SRM) is playing a major role in developing the range section of a new database called CORR (Communications on Renewable Resources) and is investigating a new current awareness service for SRM members and others in the applied range sciences. New textbooks, state-of-the-art productions, review papers, and bibliographies are coming out on range improvements, but more are needed. A major need is a concerted effort to provide more economic and statistical intelligence for planning, initiating, and executing range improvement principles and practices.

Customized, on-the-ground planning, installation, and maintenance of range improvements is a necessity for success. Elucidating objectives clearly, prescribing to specifics, using proven practices (except on small-scale trial basis), and being aware of cure-alls are a few good rules to follow. Whatever happened to the basic range improvement principle of putting the money where the potential is rather than invariably only where the problems lie? Maintenance of valuable range improvements is a must and is too frequently forgotten. Whose job is maintenance in cooperative projects on state and federal lands? This must be clarified and enforced.

The BLM has proposed to transfer to permitees the maintenance of all structural improvements on BLM grazing allotments constructed to facilitate the management of livestock; and the permits would be duly rewarded (Rangelands 3:246, 1981). The proposal also specifies that the BLM would pay for reconstruction of structural improvements and provide maintenance on all non-structural improvements. If the rancher is to be designated as the ultimate range improvement technician on both private and public grazing lands—and this has some positive aspects—then a big training and education job is ahead for Extension, Soil Conservation Service, livestock association leaders, and federal land management agencies. An observation frequently made—and this with obvious exceptions—is that ranchers seem to adopt livestock improvement techniques faster than range improvement practices.

Although there is a backlog of unused range improvement research, this backlog is rapidly dwindling in the absence of emphasis on applied grazing management and range development research. More research should be directed to new methodology and equipment, new herbicides, insecticides, and cultivars, renewed emphasis on difficult sites with good forage potentials, and more economic guidelines. Intensive application of the latest research technology is essential for achieving the potential productivity of rangelands. Demonstrations of achieving site potential through intensive range improvements and accelerated management should be used more fully by research, extension, and service personnel.

More money must be allocated to range improvements by federal and state agencies as well as ranchers as an investment in the future. This higher priority must include technical personnel, equipment, seed, chemicals, and materials. Agencies must be freed from the pressures of well-meaning, technically incapable publics and get on with the work. Self-imposed restrictions, such as the area of herbicides for brush management, should be lifted to provide greater flexibility in planning. Range scientists and SRM should unite behind
efforts to free some pesticides critical for range use from
unwarranted EPA restrictions and red tape.

Specialized range improvement equipment must be made
more widely available. The high purchase cost of heavy
duty equipment will often make leasing more realistic than own-
ing. Arrangements to pool equipment between districts and
even between agencies through interdepartmental loans has
many advantages. Such as agreement is now in effect
between the U.S. Forest Service and the BLM in Utah. More
equipment could be made available to ranchers on a lease or
loan basis by federal and state agencies, soil and water
conservation districts, equipment dealers, and conservation
contractors. The benefits of contracting out range improve-
ments requiring specialized, heavy equipment should also
be considered.

Greater financial assistance is needed for range improve-
ments in the private sector. Chief among the problems is the
high interest rates on borrowed money; a hopeful sign is the
lowering of interest rates during the last half of 1982. Provi-
uing low-interest, revolving range improvement money has
been provided by some state legislatures, but more such
ear-marked funds are needed from both state and federal
sources. Intermediate-type loans matching repayments to
slowly increasing returns are needed from commercial sour-
ces. Tax incentives for range improvements on private range
might be considered.

Enhancing or redirecting cost sharing programs such as
ACP and Great Plains into long-term agreements for range
improvements is another need. With the return of improved
ranch profits, incentives for rancher cost-sharing in improv-
ing federal rangelands should be more fully investigated
also. "There is no substitute for individual stewardship and
economic incentive to stir effective action" (Merrill 1979).

Summary

The benefits of intensive range improvements when prop-
erly applied and coordinated with management systems can
be realized by a wide spectrum of rangeland user groups.
Achieving maximum sustained yields on both private and
public rangelands will require this combined approach.

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