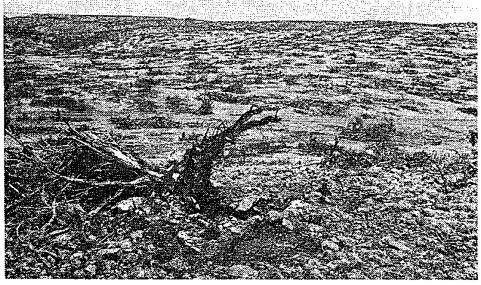
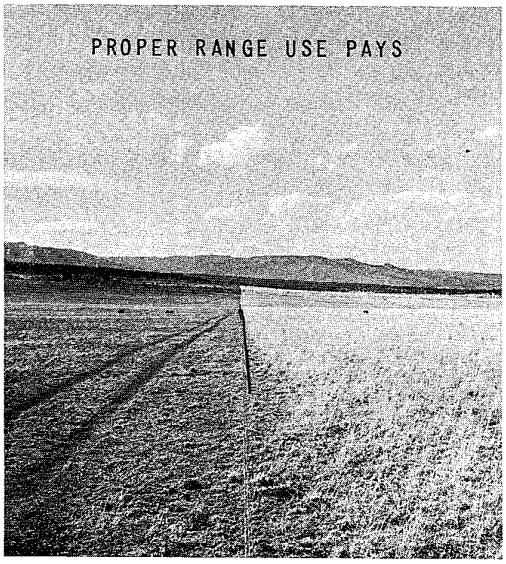
RANGE CONSERVATION - TECHNICAL NOTES

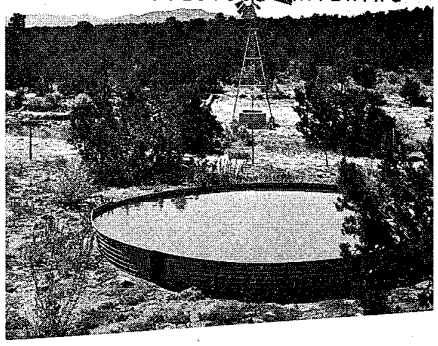
L CHEMICAL PLANT CONTROL

CHAINING PINON JUNIPER

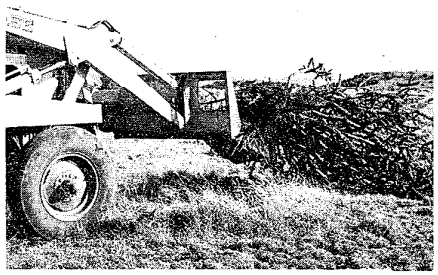




GOOD LIVESTOCK WATERING



CHOLLA CONTROL



U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NEW MEXICO

RANGE TECHNICAL NOTE NO. 63

October 30, 1974

RE: Planning Management Practices on Rangelands

This Range Technical Note transmits a paper prepared by D. D. Sylvester on an "Approach to Range Management Based on Ecological and Physiological Principles".

Range management has developed into two schools: the science as studied by technical people and the applied art as ranchers use it in their everyday operations.

Conservationists with the Soil Conservation Service, although greatly interested in the aspects of vegetative management, will seldom actually operate a ranch. The rancher is the manager of the range. He is respectfully independent and does not do things greatly different from what he has been doing at the mere suggestion of a trained range man. A simplified approach is here presented based

Attachment

AC's - 2 ea.
DC's - 1 ea.
Area Range Conservationist - 1 ea.
Adjoining States - 1 ea.
STSC, Ft. Worth - 2
V. H. Barry, Jr., Director, Plant Sciences Div., Washington, DC - 2

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on some intense ecological and physiological studies that may be used to bring the two facets to a common understanding that will result in more and better application of management practices on rangelands of New Mexico.

Additional copies are available in the State Office Plant Sciences Section. Area Conservationist's should order copies for all new employees in training positions.

AN APPROACH TO RANGE MANAGEMENT
BASED ON
ECOLOGICAL AND PHYSIOLOGICAL PRINCIPLES

by

D. D. Sylvester

For

Graduate Seminar

852M

University of Wyoming

Laramie, Wyoming

February 14, 1962

AN APPROACH TO RANGE MANAGEMENT BASED ON ECOLOGICAL AND PHYSIOLOGICAL PRINCIPLES

There is increasing awareness that student and professionals in range management and associated sciences must be able to communicate with ranchers who apply the results of research. It is said by the animal husbandryman, "The eye of the master fattens the beef". With good correlation, it can be said, "The eye of the master manages the rangeland for sustained production and conservation". For the purpose of this paper, rangeland will be land where present soils and climate, in conjunction with plant succession, produce natural pastures (Dyksterhuis, 1951).

In his textbook, Oosting (1958) states:

> The objective of range management is to produce the highest possible forage yield while the condition of the range is maintained or actually improved. To this end, the methods of ecology have been used to such an extent that range management is largely applied ecology. If progress is to be made in the field of range management, the gap must be narrowed between what is known ecologically about range and what is practiced every day by the rancher.

Stoddart and Smith (1955) noted:

> Since range plants and range livestock are biological organisms, their interrelationships are ecological in nature. Range management is applied ecology since it consists of manipulating the environment in which both plant and animal live, in such a way as to provide each, as far as practicable, with its most favorable habitat. . . . Range livestock, although not a natural factor of the habitat, becomes nonetheless a part of nature's great plan. Stockmen must realize that this change, this introduction of a new element into nature's balance, must introduce also widespread changes elsewhere in the habitat. No one knows all these complex interrelationships, but the range manager must be aware that the relationships exist. Ecology is the foundation of intelligent range management.

Since the ranchers are not apt to use ecological terms, it will be up to those trained in range to use a language understandable to them. It must be clear to this point that the intelligence of ranchers should never be underestimated nor should their knowledge of the physiological and ecological principles governing range deterioration or improvement be over-estimated.

Ranchers have principles of operation all about them which are self-evident. They are common, everyday chores. The job of breaking into this operation becomes the challenge of the range conservationist. The range conservationist may be keenly interested in ecology, but, too frequently, fails to see the opportunities to inject ecological concepts into the

operations of the ranchers. Realizing that people, in general, need to be exposed to wholly new knowledge several times before actually using it in everyday practice, the challenge is ever before the range technician.

A concrete approach is most effective with ranchers. The soil and the vegetation are a reality to them. Real attention will be needed if pertinent ecological concepts, such as climax, secondary plant succession, and the fundementals of plant physiology, are to become interesting to them.

How may the rancher be approached with such scientific concepts when he is primarily not concerned with them as such? Ranchers are interested in certain things, especially in what happens to the range in terms of natural laws. These things they understand. There are many things that happen on rangeland that are not understood but there are some natural laws to help guide the management of range. They are laws that apply wherever rangeland is found. They are reasons for adjusting or managing different ranges in different ways and are principles of operation which are readily understood by ranchers.

The first principle is: Keep down the shoot and kill the root. In the range-trained man's mind, this means plant physiology in relation to grazing, but to the rancher, it can readily be seen that food is manufactured in the leaves of grass from elements in the soil and air and that it takes a big factory to develop extensive roots and turn out much grazing. (Stoddart and Smith, 1955). An immediate connotation is that plants, as well as animals, can be starved. If the shoot is grazed, there is usually enough storage from previous growth to put out another shoot, but if repeated removal of top growth is permitted in the same season, the root will be weakened and its ability to reach moisture and nutrients will be reduced. The man whose pasture looks half used each fall gets more grazing than the man whose pasture is kept short (Dyksterhuis, 1951).

The second natural law is readily accepted by the ranchers and is basic ecological principle in range management. It is a law of physics, but it has its analogy on the range. Nature abhors a vacuum. Sampson (1919) recognized this in stating, "The most rational and reliable way to detect overgrazing is to recognize the replacement of one type of plant cover over another".

The soil is seldom void of cover for any extended period. If plant cover suitable for grazing is not left on the soil, new species will become established that are perhaps less productive or less palatable. Palatable plants on certain over-stocked ranges give way to short grass, weeds and woody plants. Coupland (1961), in reconsidering grassland classification, concludes, "The effect of heavy grazing is to cause a shift in the composition of vegetative cover towards a more xeric type of community. Certain forbs have a reputation of being indicators of overgrazing in the area". Tall grasses which are grazed short will have 80 to 90 percent of the

manufacturing plant removed. Shortgrasses, on the other hand, will have lost only 30 to 50 percent of their manufacturing plant. They will still be in a healthy condition and able to replace the weakened tall grasses. Dyksterhuis (1948), in reporting on the Western Cross Timbers of Texas concluded, "Indiangrass and big bluestem have been almost wholly replaced since occupation of the area by settlers. The little bluestem is reduced . . . . The short grass is most abundant among perennial grass invaders". It is commonly stated that short grasses can withstand intensive utilization, but, in reality, they escape close grazing. In any grazed pasture, the highest producing and most palatable plants will tend to be eliminated. They are called "decreasers" (Dyksterhuis, 1949). Other plants, primarily short grasses, will fill in the place once occupied by the higher producing species and are known as "increasers". Those that are less palatable invade the areas once occupied by the "decreasers" and the "increasers". Once the increasers and invaders have taken over, less production is realized, and this speaks common sense to ranchers whose livelihood depends on production.

When an area is invaded by less palatable and less productive species, another law becomes applicable. To the ecologist, it is known by the term "succession". Gleason (1926) states, "Sooner or later each community gives way to a different vegetation, constituting the phenomenon known as succession". In common treatment, it can be said, Nature is always trying to put back the kind of vegetation that was on a piece of ground in the first place. Annual weeds will try to establish on cultivated soil. The changes in kinds of plants on abandoned fields and pastures that are rested are all part of the process. These changes go on until there is a kind of balance. That kind of vegetation is called climax. Climax may be defined as the highest point, or culmination, of plant succession. Different areas will have different climaxes. Depending on the history of past use, many kinds of vegetation may occur on the same site (Dysterhuis, 1949). Natural succession will usually increase the better and higher producing plants on the range if it is simply given a rest. It may be as simple as closing the gate. In this day of machines, fertilizer, and wonder drugs, sometimes it is difficult to accept such a simple treatment as closing the gate, changing the season of use, or adjusting numbers and letting nature take over with natural ways. Range will be managed better when the natural law of plant succession is recognized (Sampson, 1917).

The last law, not all ecological, is a law well recognized by ranchers and others in agriculture. It is: Water is the limiting factor in grassland climates. There is little that can be done to control the amount of rain to fall, but there is something that can be done with what falls. Every means of management must be used to store more water in the soil for plant growth and to stop runoff from the surface of the soil.

Nature has safeguards which permit the soil to be covered with vegetation and mulches from previous growth (Dysterhuis and Schmutz, 1947). When cover is permitted by proper management, soil is not puddled by rain drops, and water infiltrates the soil. Once the water is stored in the soil, it remains there for use by the plants. The soil must be covered to receive maximum benefits offered by the climate. The man with the bare looking range has the greatest need for a rain, but the man with good cover on the range will reap the most benefit when the rain falls. It is good business to graze so that some vegetation is left. The vegetation left will mulch the surface for soil protection and facilitate water storage (Rauzi, 1960).

With these natural laws to guide grazing use, ranges can be well managed. With these principles, ranchers can and will readily see the benefits of good management. The approach must be scientific without being technical and yet show that it is practical to be technical. Ecological knowledge will be recognized by ranchers that will be valuable - so valuable that they will not wish to operate without it. Ecology must be presented in phraseology that can be carried over the ranch, mulled in the mind, and used for discussion. Until ranchers discuss matters among themselves, much as they discuss cattle prices or the weather, we have not made conscious application of ecological and physiological knowledge over vast areas of range.