Field Methods Used to Demonstrate Range Conservation

HORACE L. LEITHEAD

District Conservationist, Soil Conservation Service, Marfa, Texas

THE energy with which a farmer or rancher applies his range conservation program is likely to be in direct relation to his understanding of it. And his understanding, likewise, is apt to depend more on what he has seen than on what he has been told. Methods used to give a man this understanding through "seeing" are usually called visual aids.

The rancher naturally wants to know immediately what he can do to get his range in higher condition.

"But what can I do without rain?" he asks. "It hasn't rained enough to make my grass head out."

The grass, it is usually safe to say, did not head out because the range was too depleted to make use of the rain that fell. The landowner wants to know why the amount of grass his land produces is not in proportion to the rain he gets. It is easy to point out that the grass produced may be due to the condition of the range, and to the ease with which the soil can absorb moisture and make it available to plants.

Soil texture and soil moisture have a bearing on the amount of moisture the soil can take up and hold. The depth of the soil is important, too. But it is easier to show this than to tell it. Take a "sharpshooter" spade and dig around in several spots to see what the soils are like.

In a valley the soil is deep. Feel the texture—see how fine it is. Soil moisture is held as a film around these tiny particles. It takes two to three inches of water to wet soil like this as much as a foot in depth. On the other hand, a coarse soil requires less than an inch of moisture to wet it a foot down. The finer the soil the greater the holding surface for the film of moisture.

Select a plot where the range is excellent. Usually the soil here is darker in color than it is on poor condition ranges. That means there is more litter and organic matter—the living and dead plant matter, animal life and humus. The decay of grass roots, leaves, and the formation of humus improves the fertility, the physical condition and the water-holding capacity of the soil. The rate of water intake and storage capacity of any soil type can vary with the amount of organic material in the soil.

For any range site, it is recognized that certain combinations of plants largely determine range condition. It is only when a range is managed in such a way as to build up plant vigor and to return organic matter to the soil that we can expect the combination of plants known as climax vegetation or range in excellent condition to become established.

Just after a rain is a splendid time to show how range condition makes a big difference in moisture infiltration. Where a fence divides different range condition classes is a good place to show this. Use the sharpshooter spade again. Dig holes to show the depth of moisture penetration.

In May of 1948, after a two-inch rain at Marfa, Texas, Soil Conservation Service range men and a group of ranchmen checked a site where a fence divided range in good and fair condition. They found that on the range in good condition the soil was wet to a depth of 30 inches. Across the fence that same amount of

rain had penetrated the soil only two inches. Three weeks later the grasses were starting to head out on the range in good condition, while on the other side of the fence, the grass had grown up about two inches and had burned up for the lack of moisture.

If a range technician is working with a rancher or a group and there is no rain to permit this demonstration of soil-moisture

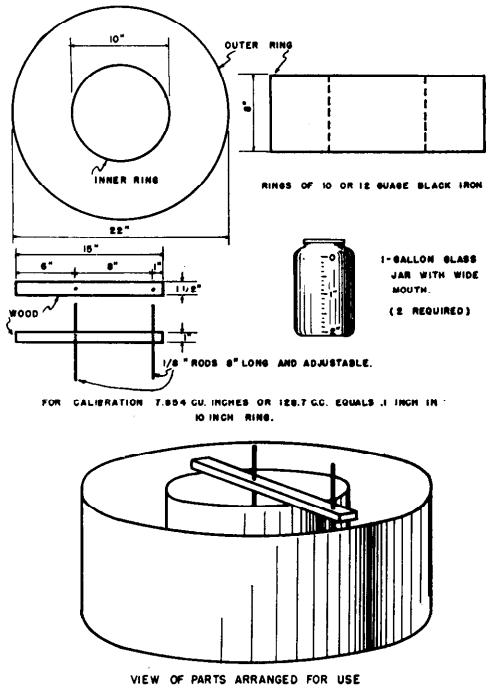

FIG. 1. Concentric rings for making soil infiltration rate determinations.

relationship, there is another demonstration that can be used. Infiltration rings, as shown in Figure 1, will demonstrate how fast different soils can absorb moisture.

These iron rings of 10 or 12 gauge black iron can be driven into the ground two or three inches so that water cannot seep out from under them. A board with two nails in it may be laid across the rings so that one nail is in the middle of the center ring and the other halfway between the inner and outer rings. The nails should be adjusted so that the points are two inches above the ground. From a one-gallon glass jar or similar vessel calibrated in tenths of inches with the size of the inner ring, water is applied to the inner ring. The vessel should hold two inches of water, the initial application. At given intervals water is added to both rings to bring the water level up to the points of the nails. Time and amount of water applied to the inner ring are recorded, with the time interval between applications. Water is applied to the outer ring to compensate for the lateral movement of moisture in the soil, but no measurement of this is necessary.

Single rings may be used on field tours to show trends in infiltration rate. Double rings are more accurate because lateral penetration of moisture is avoided.

Those who see this test can readily understand the meaning of Table 1.

TABLE I

Record of the Amount of Water Applied at given Intervals of Time on a Range in Excellent Condition

TIME	TIME INTERVAL	WATER INTAKE	TOTAL WATER INTAKE	TOTAL TIME
	min.	*in.*	*in.*	
11:10				
11:13	3	2.30	2.30	3
11:17	4	1.45	3.75	7
11:20	3	1.00	4.75	10
11:25	5	1.35	6.10	15
11:30	5	1.20	7.30	20
11:35	5	1.20	8.50	25
11:40	5	1.00	9.50	30

Let us look at some information that was collected on four range condition classes on a rolling hill site in the Highland Soil Conservation District of West Texas. The relationship of range condition, forage production, soil fertility, and rate of water intake was determined.

First the range on the rolling hill site

TABLE 2

Range Condition

Rolling Hill Site in the Highland Soil Conservation District, Marfa, Texas

NAME OF SPECIES (SCIENTIFIC)	NAME OF SPECIES (COMMON)	PERCENT OF COMPOSITION			
		Excellent	Good	Fair	Poor
DECREASERS[1]					
Bouteloua curtipendula	Sideoats grama	35	20	10	1
Elyonurus barbiculmis	Woolspike balsamscale	20	7		
Andropogon scoparius	Little bluestem	7	1		
Andropogon barbinodis	Cane bluestem	5	5		
Leptoloma cognatum	Fall witchgrass	3	1		
Psoralea tenuiflora	Wild alfalfa	1	1		
Dalea pogonathera	Bearded dalea	1			
Petalostemon occidentalis	Western prairieclover	1			
Artemisia dracunculoides	Falsetarragon sagewort	1	1		
Dyschoriste linearis	Narrowleaf dyschoriste	1			
Lygodesmia texama	Texas skeletonplant	1			
Berlandiera lyrata	Lyreleaf greeneyes	1			
Eriogonum wrighti	Wright wild-buckwheat	1			
Engelmannia pinnatifida	Engelmanndaisy	1			
INCREASERS[2]					
Bouteloua hirsuta	Hairy grama	15	35	45	3
Lycurus phleoides	Wolftail	5	10		
Bouteloua eriopoda	Black grama	1	5	5	5
Aristida (Sp.)	Threeawn	1	5	10	45
Nolina texana	Texas sacahuista	2	6	8	7
INVADERS					
Panicum halli	Halls panicum	T	1		1
Muhlenbergia arenicola	Sand muhly			10	7
Triodia pilosa	Hairy triodia			5	20
Triodia pulchella	Fluffgrass			2	10
Croton cormybulosus	Leatherweed croton	T	T	3	1
Gutierrezia sarothrae	Broom snakeweed			1	
Opuntia engelmanni	Engelmann pricklypear			1	
	TOTAL	100%	100%	100%	100%

[1] Decreasers are climax plants that go out first under heavy grazing.

[2] Increasers are climax plants that increase temporarily and later decrease under heavy grazing.

was divided into four range condition classes (Table 2) based largely on the kinds of plants making up the forage cover. The most valuable plants occurred on range in excellent condition, whereas the least valuable plants occurred in abundance on the range in poor condition.

Analyses of these soils give the percent of organic matter for each range condition class as:

Excellent Condition	4.6
Good Condition	3.8
Fair Condition	3.6
Poor Condition	2.1

The amount of litter and vegetation on the soil has a great influence on surface soil temperatures and the ranch operator should understand that this affects his forage production. Temperature readings (in Fahrenheit) in the surface layer of soil

on these four range condition classes in August, 1947, with an atmosphere temperature of 90° were:

Excellent Condition	104°
Good Condition	110°
Fair Condition	114°
Poor Condition	120°

A soil thermometer helps to show how range condition affects soil temperatures. Moisture lost through evaporation increases as soil temperatures increase, thus reducing the amount of moisture available for plant growth.

The relation of the amount of surface litter and other vegetation to the rate at which moisture soaks into the ground is extremely important. This cover breaks the force of falling rain. It increases penetration, thereby reducing runoff. The increased penetration pays off in higher plant and animal production.

Water was applied by using infiltration rings in the manner previously described to find the influence range condition has on the rate of water intake (Fig. 2).

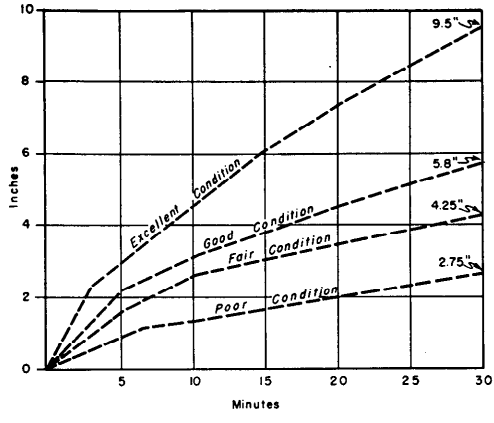

FIG. 2. Rate of water intake as influenced by range condition.

To check forage production on each range condition class a two-foot quadrat can be laid out. The vegetation inside the quadrat is clipped and weighed. Results of one such comparison are shown in Figure 3. Litter in this same quadrat was collected and weighed to find out how much was being returned to the soil to decay and be incorporated as humus. These weights (Fig. 4) reflect an accumulated amount of litter and not the exact amount being returned in any one year.

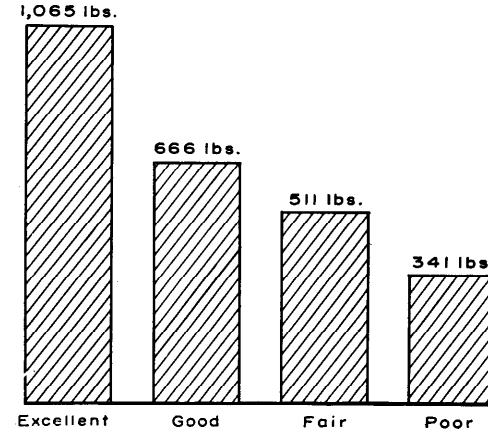

FIG. 3. Pounds of air dried vegetation produced per acre on rolling hill site according to range condition class.

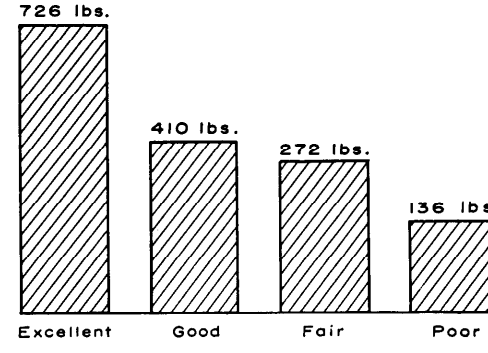

FIG. 4. Pounds of litter per acre on rolling hill site according to range condition.

Grass production can be increased several times by properly managing a range to bring it back to excellent condition.

When landowners become convinced that something needs to be done, and when they see that they will benefit by doing it, they will speed up conservation work which will return ranges to excellent

condition. Simple methods can be used to help everyone understand conservation problems and treatment. These methods, of course, can be used more effectively with groups than with individuals. Working with groups means spreading information more quickly, thereby allowing time for detail planning on a large number of individual ranches. This results in more conservation plans developed and applied, with the same manpower. Ranch planning requires time and hard work, and the planner, as well as the ranchman and the public, wants results.

PRESIDENT TRUMAN SPEAKS ON SOIL CONSERVATION

In his address to the Congress on the State of the Union, on January 4, 1950, President Truman said, in part:

"If we are to achieve a better life for all, the natural resources of the country must be regarded as a public trust. We must use our precious assets of soil, water, forest, and grassland in such a way that they become constantly more productive and more valuable."

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