Range Developments-- A Key to Better Grazing Use

The purpose for range developments is to facilitate better and more efficient range use by livestock. Range developments are fences, stockwater developments, roads and trails, animal-handling facilities, and stock driveways. Each development serves specific functions. Each one should add some overall benefit from not only an economic standpoint but from an efficiency of management point as well.

Good management is more than having the correct or adequate number of watering locations, fences, and roads or trails. Good management is being able to use these developments to best advantage for overall animal and plant production over a sustained time period. In other words, adequate range developments do not mean that adequate range management automatically follows.

Need for some kind of development occurs whenever the manager finds that overall range forage utilization and optimum livestock production are not well matched, even though substantial use of salting and riding may be used to distribute grazing. Range developments, as with range improvements, require capital cost investment, thus must be of economic benefit. Ask yourself: How many AUM's (animal unit month) of unused forage do I have? Where is it located? When is it available? Why don't the cattle harvest it adequately? If it is not accessible, will a road or trail make it so? Must stock be fenced into a particular area to force them to utilize it?

By knowing the relative amount of unused or under-utilized forage, calculate its value based on realistic prices. This will give an estimate of the yearly increased increment of forage value. With this information and costs of particular developments, for example, 2 miles of fence and two water developments, you can analyze whether you can afford to make the investment.

Water and Its Sources

In addition to providing cattle with water of good quality, water developments can be an effective means of distributing livestock on the range. Regulating cattle access to water will permit better utilization of forage on previously poorly utilized areas. Location of water is important in controlling the movement, distribution, and concentration of stock. More locations are needed on steep than rolling terrain. Cattle will not travel more than ½ mile in mountainous terrain and no more than 1 to 1½ miles on level range and make even forage use. One watering facility for each 50 to 60 animal units is desirable if the unit is expected to be used all season.

When at all possible in rough terrain, stockwater should be located on sidehills or just off a ridge rather than in canyons. Cattle will graze

---

Prepared by Thomas E. Bedell, Extension Rangeland Resources Specialist, Oregon State University, Corvallis.

Extension Circular 1043 **December 1980**

OREGON STATE UNIVERSITY EXTENSION SERVICE

Extension Service, Oregon State University, Corvallis, Henry A. Wadsworth, director. Produced and distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914. Extension work is a cooperative program of Oregon State University, the U. S. Department of Agriculture, and Oregon counties. Extension invites participation in its programs and offers them equally to all people.

down from water a greater distance than they will up from water. Amount of water needed varies by class of stock and season of use. Lactating cows and calves consumed 15 gallons per day in Oregon studies, whereas dry cows drank 10 to 12 gallons. Yearling heifers needed 8 to 9 gallons per day for a summer period, but only 6½ gallons per day if watered on alternate days. Water intake will be less on green forage in spring and when weather is cool.

Numerous kinds of water developments exist and are discussed here only briefly. For any new development, be sure to determine whether a permit needs to be filed for its use. In many western states the development and use of both surface and groundwater is controlled by state regulations. Before investing in water developments, consult the appropriate regulatory agencies to insure compliance.

Consult the accompanying chart to help determine the cost per AUM for water if you know the stocking rates for the areas to be served and the costs of the developments.

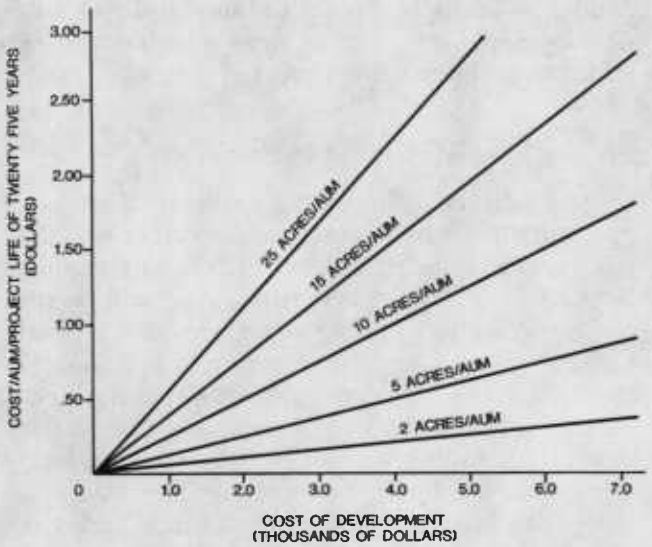

Figure 1. Cost of water development in relation to stocking rate. (From Duncan, 1973. Spring Developments-BLM mimeo, Ore-Wash State Office.)

Streams are not considered as developments. If streams are only intermittent, consider providing a reservoir. Permits are required for reservoirs. On perennial streams public concern exists for bank protection and maintenance of high water quality. Consequently, use care in grazing intensities on such sites to prevent or minimize such breakdown. If the stream is fenced separately, make provision for water gaps. Care in construction will pay off in lower maintenance costs. It has been estimated that the dollar value for each day of maintenance can be as high as 15 percent to less than 5 percent of the initial investment.

Springs

Careful development is needed. A flowing spring has great value. Water could be tanked and piped great distances, spreading the value over several thousand acres. Low-flowing springs, if properly developed, can be very beneficial. For example, a spring flowing at only one-half gallon per minute produces 720 gallons per day, or enough for 48 cows and their calves during summer. In all cases, develop springs and seeps in such a way that stock do not have opportunity to trample the source. Several development techniques exist.

Often, location of potential spring developments is aided by consulting current aerial photos or by flying the area. Use of color, infrared film will allow water-loving plants to show up differently in the picture. Sometimes spring flow can be increased dramatically by removing trees and brush in the vicinity. Springs have started to flow following control of brush in several western areas.

Reservoirs and stock ponds

Success depends greatly on pattern and amount of precipitation and on the soil type. Often ponds dry up by late summer and fall, so their reliability as a water source is not as great as a spring, streams, or well. Care in construction is critical. Spillways are necessary. Specifications can be obtained from technical agencies. Reservoirs should be built with as small surface area as possible in relation to depth. High sides reduce wind movement and decrease evaporation. It often is desirable to fence reservoirs and either trough the water out through the dam or build a water gap.

Seepage can be controlled through use of materials like bentonite or special clays, or compacting the reservoir floor. Information about other techniques such as salt treatment or plastic liners can be obtained from the Soil Conservation Service or other technical advisers.

Wells

Vertical wells provide reliable water sources and often can be drilled near the forage supply. Cost of development may dictate how far the water can be extended. In much of the West, wells, storage tanks, and pipelines are a major water source.

Horizontal wells are a relatively new development in the West. Basically, a horizontal well is a pipe bored at a slight angle down into a hillside to tap small, seepy flows of water. Water flows of its own accord, by gravity, as with a spring. It is piped and can be controlled with valves. It is of high quality.

Hydraulic rams

This age-old device deserves more use in the mountain West. Water from a spring or other sources such as a ditch or small stream is diverted into a drive pipe to the ram which lifts it through a delivery pipe. The basic minimum is a flow of 1½ gallons per minute with a fall of 20 inches or more. A theoretical lift to fall ratio of 25:1 exists. If water is needed at a higher elevation than a spring source, the ram has real possibilities.

Water catchments

Numerous possibilities exist. Eastern Oregon studies show precipitation can be collected by using metal sheeting on a frame, shedding rain water into circular tanks of various sizes. Such developments can be placed anywhere the materials can be transported.

Research has been done on other kinds of catchments. The reliability of precipitation is an important factor. Catchments often are used where there is not enough precipitation for a stock pond and other sources of water do not exist. The principle is the same regardless of kind of catchment: precipitation falls on an impervious surface, is drawn off to a storage tank, and led into a water trough. Many types of surface can be used, flat rock outcrops, highways and roads, smooth packed soil (must have enough clay), chemically treated soil (silicone, parafin wax, sodium carbonate), mechanical covers (concrete, gravel-covered membranes, asphalt-soaked material, rubber and artificial rubber, sheet metal). The accompanying table gives some guidelines as to effectiveness and costs. If you wish to use catchments you are advised to get further technical help.

Pipelines

A great deal of range forage has been opened up since the advent of PVC (polyvinyl chloride) and plastic pipe. Piping is generally by gravity. Pipe should be buried but will work well above ground, although it will not last as long. Water can be turned on and off as desired, a definite advantage in influencing grazing distribution.

Hauling

This is generally considered as the last alternative in providing stock water because of cost, effort, and inconvenience. Costs have ranged as high as $10/AUM depending on the amount hauled, distance, and terrain. Hauling can result in distributing grazing to areas that otherwise would not be grazed. Stock may get to drink more often and generally do not need to travel so far when water hauling is practiced. Because of cost of hauling water the need for the forage must be considered carefully. Roads must be maintained in good condition. Thus, very rough country is not conducive to water hauling. Move water tanks often to improve evenness of use.

Water Costs for Various Water Harvesting Treatments.

Treatment	Runoff	Estimated life of treatment	Initial treatment cost per yard[2]	Annual amortized cost[1] per yard[2]	Water cost per thousand gallons in a 20-inch rainfall zone
	Percent	*Years*			
Rock outcropping	20-40	20-30	$<0.01	$<0.02	$0.22-0.45
Land clearing	20-30	5-10	0.01-0.02	<0.01	0.30-0.45
Soil smoothing	25-35	5-10	0.05-0.07	0.01-0.02	0.25-0.71
Sodium dispersant[2]	40-70	3-5	0.07-0.12	0.01-0.02	0.13-0.45
Silicone water repellents[3]	50-80	3-5	0.12-0.18	0.02-0.04	0.22-0.71
Paraffin wax[4]	60-90	5-8	0.30-0.40	0.05-0.10	0.50-1.49
Concrete	60-80	20	2.00-5.00	0.17-0.44	1.89-6.53
Gravel covered membranes	70-80	10-20	0.50-0.70	0.04-0.10	0.45-1.27
Asphalt fiberglass[5]	85-95	5-10	1.00-2.00	0.14-0.48	1.31-5.00
Artificial rubber[6]	90-100	10-15	2.00-3.00	0.21-0.41	1.87-4.00
Sheet metal[7]	90-100	20	2.00-3.00	0.17-0.26	1.51-2.57

[1] Based on the life of the treatment at 6 percent interest.

Source: Journal of Range Mangament. 28:430

[2] Cluff, 1975.

[3] Myers and Frasier, 1969.

[4] Fink, et al., 1973.

[5] Myers and Frasier, 1974.

[6] Lauritzen and Thayer, 1966.

[7] Lauritzen, 1967.

Fences

Although water by itself is an excellent way to improve or manipulate grazing distribution, it is difficult to put a rotational grazing plan into effect without using fences to control livestock. Animal behavior will indicate where fences should and should not be. Consider the natural boundaries or barriers to livestock movement. Fences need be built only for the specific purpose the producer has in mind.

Every producer has or will develop guidelines for building fences. The following are general considerations:

- Build along the contour whenever possible. The fence will be stronger and the cattle will not crowd it as badly.
- Don't fence down a drainage bottom but, rather, split it at an angle.
- Fence by site whenever possible.
- Don't fence up and down slope, but at an angle.
- Always remember the objective for the fence. You want to visualize how it will work before it is built.

Producers should consider suspension fences when terrain will permit. Both cost of construction and materials may be reduced substantially. When made properly, suspension fences actually turn cattle better than conventional barbed wire ones. The principle of spooking the animal through both the movement of the wire when touched and the sound from wind works well.

For use in country where deep snow packs are a problem, the let-down or lay-down fence has merit. This means a fence that is let down in the fall and put up in the spring. Yearly maintenance costs are reduced as compared to conventional fences where wires often are broken and posts pulled or bent over. Construction costs will be somewhat higher. Since the wires are on the ground during winter, their life will be somewhat shorter.

Roads and Trails

It is no secret that cattle use roads and trails just as humans do. Putting them into steep or both steep and timbered terrain will aid grazing distribution. Where commercial timber harvesting occurs periodically, roads and grazing go well together. Roads and trails can make gathering cattle much easier. As with other range developments, analyze what is desired first and then determine if developing more roads and trails will achieve it.

Other Developments

Corrals and handling facilities, stock driveways, and provision for shade require little discussion. The modern beef producer works stock several times each year. Doing some of that on the range is necessary. Construct a facility where several pastures join. Include a scale so performance by pasture can be determined.

Stock driveways may be on their way back, as the cost and availability of fuel changes. Whether such a passageway is required will depend on the number of times movement is needed and by how many cattle. Driveways historically were used for movements between seasonal feed sources. Less labor is necessary for moving along a driveway than in the open. This is a relatively more important consideration in the 1980's than in the days where labor was abundant.