When normal range livestock water supplies are reduced, the results can be (1) poor livestock performance and condition and (2) range damage caused by both overuse and underuse. Locating additional sources of stock water becomes critical to avoid damaging both animals and range resources. The following suggestions may help make the best of the water that is available.

Springs and seeps
Many areas still exist where springs and seeps can be developed. Any such water source, however small, is vital in a drought year—and it should prove helpful even in normal years. If possible, store the water in a larger tank, then pipe it to a trough(s); this way, you’ll increase the usability of even a very slow-flowing spring or seep. A flow of only ½ gallon a minute amounts to 720 gallons a day, which is enough water for 48 cows with calves.

Horizontal wells
Horizontal wells have proved economical and desirable in the Southwest, but little has been done with them in Oregon. A horizontal well consists of a pipe bored at a slight angle down into a hillside to tap small, seepy flows of water. The water is controlled with appropriate valve systems. As with springs, water is usually of high quality.

Deep wells
Although initially expensive, deep wells can provide consistent and reliable supplies of water. To extend a well’s usefulness, its water is often piped long distances. Large storage tanks are desirable if you expect wind to be the power source.

Pipeline
High-pressure plastic pipe is often used to carry water over large areas from a central source to watering locations. Piping is generally by gravity. Laying pipe above ground will work as a temporary measure, though the pipe will not last as long as it will when you bury it. Pipelines provide flexibility and conservation—you can turn water on or off as you need it.

Stock ponds
Once you’re in a drought, digging stock ponds may not provide a solution. Ponds are generally poor that precipitation will accumulate or fill these ponds. However, if you do build ponds, dig them relatively deep in relation to surface area; then either fence them and pipe water to a trough(s) or provide a livestock walkway. Fencing and troughing will minimize water loss and improve drinking quality. Ponds lose water through evaporation and seepage. You can reduce by half—on either existing or new ponds. Reduce seepage by introducing various soil amendments (bentonite or sodium salts, for example) or by lining the bottom of the pond with plastic.

Water from seasonal streams
You can develop small ponds near seasonal streams and fill them during periods of high water. You could fence these ponds and hold the water until the stream dries up later in the summer, which will provide water further into the grazing season.

Reducing transpiration losses
Vegetation growing around springs and streams transpires much water into the atmosphere. You can reduce water losses substantially by cutting and clearing vegetation that roots in the water table. You can further improve stream flow and storage by clearing weedy vegetation from larger watersheds.

As an example, you’ll help maintain stream flow if you thin stagnated stands of ponderosa pine—they transpire a great deal of moisture and produce little marketable product in return.

Water hauling
Hauling stock water becomes a viable alternative when no other source of water exists on range and your grazing animals can harvest an adequate supply of forage. Haul your daily water to existing stock tanks, or dump it directly into movable troughs. You can also use large tanks or holding structures and pipe the water into troughs.

On an emergency basis, scoop out small depressions in the soil. Line them with plastic, fence them, fill them with hauled water, and pipe the

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Thomas E. Bedell, Extension rangeland resources specialist, Oregon State University.
water to troughs. After the drought is over, you might rehabilitate the area. Design water-hauling routes in advance. You’ll need to construct some access roads. Bulldozers or road graders may not be necessary if you don’t encounter any large rocks. Construct a large “V” from two railroad irons and pull it with a wheel tractor. Try to work access roads in with other needs. Ranchers often find that roads and trails made for water hauling become quite desirable in later years.

Plan to water stock in small groups. This will mean more locations but less potential damage to range plants and less frequent movement of watering locations.

You could haul water on alternate days for mature dry cows or yearlings if you can’t develop adequate storage on site. There should be no permanent weight loss on these classes of cattle with alternate-day watering. Certainly, the fewer hauling trips you make, the more economical the water will be.

However, if you haul water to cows with calves on alternate days, some weight reduction will occur. You can expect ½ pound less calf gain per day, according to research.

Table 1 shows some estimated costs for hauling water over varying distances. Research in eastern Oregon shows these summer water consumption rates (gallons per day): yearlings, watered daily, 8 to 9; yearlings, watered every other day, 5; calves, 15; dry cows, 10 to 12.

Watering every other day reduces daily intake about 25%. You’ll need to consider evaporation and spillage losses, too.

Other considerations

Patrol range areas may be worthwhile to ensure that livestock are not without water. You should do this with a publicly owned plane or helicopter—perhaps in cooperation with one of the frequent Fish and Wildlife surveys—or through a cooperative agreement with a neighbor.

Dry cows will耐re farther from water than cows with calves—and use less water. If providing water becomes very expensive, weaning calves early would allow you to use range forage more efficiently, at less total cost.

Table 1.—Stock water hauling costs (cents per head per day)*

<table>
<thead>
<tr>
<th>Round-trip distance (miles)</th>
<th>Water hauled (gallon per head per day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>17.0  21.9  26.3  30.7  35.0</td>
</tr>
<tr>
<td>12</td>
<td>26.6  33.2  39.8  46.5  53.1</td>
</tr>
<tr>
<td>16</td>
<td>35.7  44.5  63.5  61.2  71.4</td>
</tr>
<tr>
<td>30</td>
<td>44.8  56.0  67.2  78.4  89.6</td>
</tr>
<tr>
<td>40</td>
<td>53.0  67.3  80.8  94.2 108.0</td>
</tr>
</tbody>
</table>

*Assumptions: Labor based on driving time @ 15 mph, 1.5 hours loading and unloading time, @ $7 per hour. Using available trucks, @ 67¢ per mile; 1,000 gallons per trip. Estimates by Bert Ellefeld, Extension range management specialist; and Tom Bedell, Extension rangeland resources specialist, Oregon State University.

Need for water permits

A permit from the Oregon Water Resources Department to develop water is required for certain actions. These are: (a) springs that are boxed and piped to a trough, and (b) stock ponds, wells, springs in a drainage way, or a site for diverted water.

No permit is needed to drill a seep or a well (which is vertical or horizontal) or to clean out a natural spring and leave it flowing.

If you develop a seep and don’t channel it, no permit is necessary; however, for your own protection, it’s a good idea to have a permit.

A permit is for the protection of the owner, land administered by the Bureau of Land Management, the BLM, or the permit. On National Forest land, the permittee obtains it.

You can obtain a permit application from water master offices and Soil Conservation Service offices. Enter the legal description of your location to the nearest 40 acres. Address your permit application to: Water Resources Dept., 3850 Portland Rd. NE, Salem, Oregon 97310.

After you file a permit, the Water Resources Department (WRD) normally takes 30 days to process the permission. However, if you request a permit action because of need—and if your letter accompanies your permit application—you’ll usually receive a waiver of this time period. (You might speed up the process by phoning after you file.)

Filed a completion notice after you complete the development. A representative of the WRD will normally check on completed developments.

Public assistance

You can often obtain public assistance through the Agricultural Conservation Program (ACP). Through the Agricultural Stabilization and Conservation Service (ASCS), this program will pay up to 75% of the cost of such practices as developing springs, drilling or deepening wells, installing pipelines and storage facilities, and constructing reservoirs and ponds on range land.

Funding to accomplish this is allocated to the various county ASCS committees. There are no cost-share provisions for water hauling.

ASCS also administers Emergency Conservation Programs. If a severe drought exists and if a county agrees to meet certain conditions, different provisions of the program may apply.

For More Information

A packet of rangeland drought management publications titled, Rangeland Livestock Production and Management: Drought Considerations, is available from your county Extension office.

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