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EC63-156 Water for Range Livestock

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Water for Range Livestock

By John F. Vallentine[1]

Western Nebraska, and particularly the Sandhills, is noted for its abundant water supply. However, few Nebraska ranges are naturally supplied with enough watering places to handle the number of stock the forage supply will carry.

Maximum livestock gains can be made only when both the forage and water supply are adequate. Few ranch investments give annual returns as high as needed stockwater development.

Planning Stockwater Developments

There are various types of stockwater developments. These include *natural* water supplies such as lakes, ponds, streams, springs, and seeps —and *man-made* developments such as wells, reservoirs, dugouts, sand tanks, drainage basins, and irrigation ditches.

The problem is to determine what combination of the various types best meets the rancher's needs. He must take care to see that additional stockwater is not used to crowd more livestock onto a fully stocked range. There must be adequate forage to go with the new development.

Plans for developing adequate water for drought years cannot be postponed until drought begins. Ranchers find they must carry on year-to-year programs in developing and maintaining stockwater supplies. Stockwater problems arise on the range:

1. When there are too few watering places
2. When water yield or storage (or both) are inadequate
3. When water sources are poorly distributed
4. When water developments are wasteful
5. When there are erosion problems at present facilities

Temporary water sources are often needed to relieve pressure on permanent or semi-permanent water sources. When water is short, ranchers may be forced to move their stock from the range before the forage is fully grazed. Even more common is a heavy concentration of animals at remaining water sources after the poorer springs and reservoirs dry out.

Each stockman should evaluate carefully the adequacy of water on his range. How can more be developed if needed? What grazing program adjustments would make better use of existing water?

Each stockman must include future maintenance in planning stockwater developments. Structures should be planned for minimum maintenance. Cleaning stockwater structures; repairing leaks in pipes, troughs, and storage structures; repairing damage caused by stock, floods, or vandals; and repair of moving parts must be provided.

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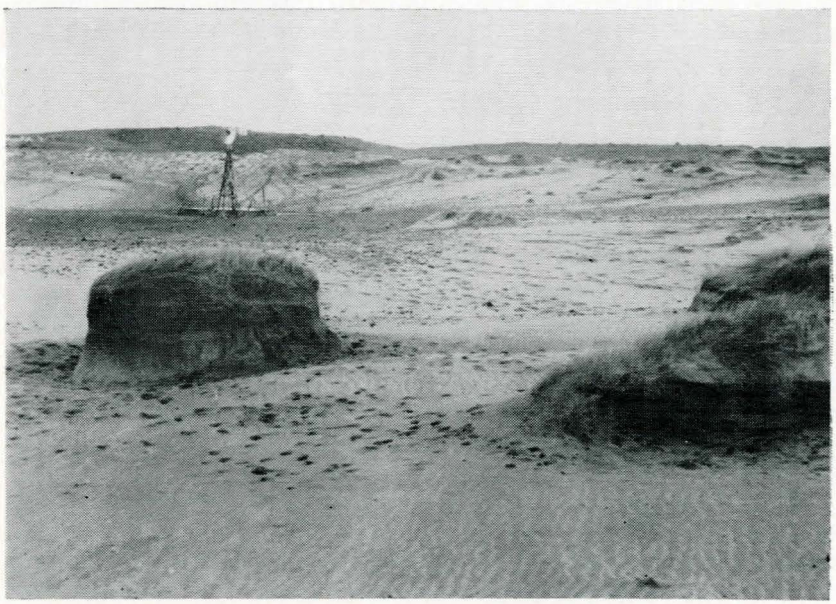
Obtaining Good Livestock Distribution

Improper distribution of grazing results from poor distribution of watering places. Cattle will graze an area close to water again and again, rather than travel long distances to better forage. This results in deterioration of large acreages near the water supply and waste of forage at long distances from water. The excessive travel associated with this inefficient use of forage is harmful to range stock and to the range land.

Livestock distribution on the range can be improved by providing enough watering places and by sound salting, herding, and fencing practices. This will allow a greater portion of the range to be fully and properly used. Actual range carrying capacity will be increased by preventing range deterioration and forage waste.

More watering places are required on rough than on level terrain. Cattle should not have to travel more than ¼ to ½ mile from forage to water in steep, rough country, or more than one mile on level or gently rolling range. You should provide at least one watering place per section, and possibly two if water can be developed at low cost.

Although most of Nebraska has readily available sources of stockwater, in some areas only temporary water can be developed. Temporary water sources are less reliable and may be dry when needed most. Graze animals in areas near temporary water when the water is available. This will use nearby range effectively and relieve congestion around permanent water.



Large blowout in Sandhills resulting from heavy concentration of stock around a single watering place. (SCS Photo)

Range Livestock Water Requirements

It is important to consider daily water requirements of range stock. Normally, eight to ten gallons per day is ample for mature cows and ¾ to 1 gallon per day for range ewes (10, 12).

High temperatures and low humidity, high salt or protein content in the diet, dry feeds, and increased feed intake all increase water consumption (14). Green, succulent forage decreases water consumption. Cattle on a salt-meal mix take in an additional 1 to 2 pounds of salt per day. Each pound of salt eaten requires an additional five gallons of water (3).

The amount of feed an animal consumes each day is a direct cause of daily gains in weight. The amount of water consumed is also important. Restricting water intake sharply reduces milk flow in lactating females and gains in both weaned and unweaned animals.

The Utah Agricultural Experiment Station has studied the effect of restricted water intake on 920 lb. steers fed in dry lot under controlled air temperatures (30° to 45°F) (2). At the end of 26 days, steers with free access to water, 25 percent restriction, and 50 percent restriction weighed 940, 920, and 870 pounds, respectively. All three groups were then allowed free access to water for a second period of 24 days. By the end of the second period, both the free access group and the 25 percent restricted group averaged 990 pounds while the 50 percent restricted group weighed 972, or 18 pounds less.

Other research and observations suggest that range sheep may be watered every second day instead of daily if average temperatures do not exceed 50°F. However, range cattle should be watered daily.

Water Quality

Keep stockwater as clean and as free of debris and decay as possible. Decomposition of dead fish and other animals may not only make the water objectionable to stock but also toxic as well. Stagnant water, even if non-poisonous, often decreases water intake by stock.

Green algae (pond scum) and mosses growing on ponds and tanks, although troublesome, will not injure stock. Blue green algae sometimes produce a poisonous "water bloom" (5). This contamination gives a greenish hue to the water and can be deadly. *Algae can be killed easily* by adding one level teaspoon of copper sulfate (or blue vitriol) per 1,500 gallons of water. Copper sulfate at this rate (1 p.p.m.) prevents algae growth and even rates up to 3 p.p.m. are not harmful to stock or fish.

In northwestern Nebraska, reduced gains and even death losses may result from range stock drinking salty water from seeps and dugouts. The mineral salts involved are chiefly sodium sulfate, sodium chloride, and magnesium sulfate. South Dakota studies indicate that 7,000 p.p.m. of soluble salts causes no apparent harm to livestock although stock may drink less of the salty water (6). However, toxic

effects can be expected from concentrations of 10,000 p.p.m., regardless of the type of salts.

Toxic amounts of salts in water from seeps and dugouts come largely from ground water rather than runoff (7). Have the groundwater analyzed for total salt content in questionable areas before seeps or dugouts are constructed. Placing seeps and dugouts so that rapid spring runoff will partially flush the water may have merit. Fortunately, livestock do not normally drink harmful amounts of salt water if good water is accessible.

Natural Water Supplies

Lakes, Ponds, and Streams

Natural water supplies such as lakes, ponds, and streams are usually reliable and require low maintenance. The value of ranch lands is greatly increased if perennial streams flow through the center of the range.

Natural water sources can often be improved by (1) fencing off boggs and quicksand, (2) building additional access ways into canyons, (3) relocating improperly placed fences, (4) controlling poisonous plants near water sources, and (5) artificially increasing the water storage or flow.

Perennial stream flowing through Sandhills meadows on Keller Bros. Ranch in Cherry County. (SCS Photo)

Springs and Seeps

Springs and seeps are formed by ground water emerging naturally through the soil. They can be developed with little expenditure except labor and will provide a dependable water supply for range stock. Even a small flow may be worth developing if the spring is strategically located.

To develop a spring first locate the true water-bearing outcrop and then dig out the soil around the area where the water emerges. Wall up the excavation with a wooden or concrete box, either prefabricated or constructed at the site. On impervious rock or soil, use a concrete or stone curbing to collect the flow.

An adequate collection basin can sometimes be made by digging toward the spring source and filling with rounded rock. On boggy soil with a small source of water, a system of tile drains or rock-filled ditches may be used to good advantage. An open cut below the spring will collect the water if the flow is being lost by seepage.

It is better to cover the collecting basin and pipe the water to a trough than allow livestock direct access to the basin. Check to make sure there are no leaks in the basin, pipe, or trough. Inspect the spring periodically and clean it when needed. If the site is boggy or if a removable cover is used, fence the spring from livestock. Also, protect it from surface runoff.

Muddy spring site greatly in need of development. (SCS Photo)

This picture shows installation of collection box and lead-out pipe at a spring site. The box is a 30-gallon barrel perforated around the bottom. The excavation around the box will be back-filled with coarse rock and gravel. (SCS Photo)

Water yield from a spring can usually be increased by removing water-loving plants and brush from the immediate vicinity. Most brush species can be killed with 2,4,5-T or silvex applied at the rate of 2 lbs. acid equivalent per acre. Cattails and rushes are most effectively killed with dalapon at the rate of 20 pounds acid equivalent per acre.

Seeps are somewhat more costly and more of a gamble to develop than are springs. They are usually found on flat terrain where it is difficult or impossible to pipe water to a trough. This requires direct access by stock, a hazard with certain soils. Using crushed rock or timbers on access points may help. To develop a seep excavate an open water source with a bulldozer or back-hoe or by dynamiting where the water table is near the surface.

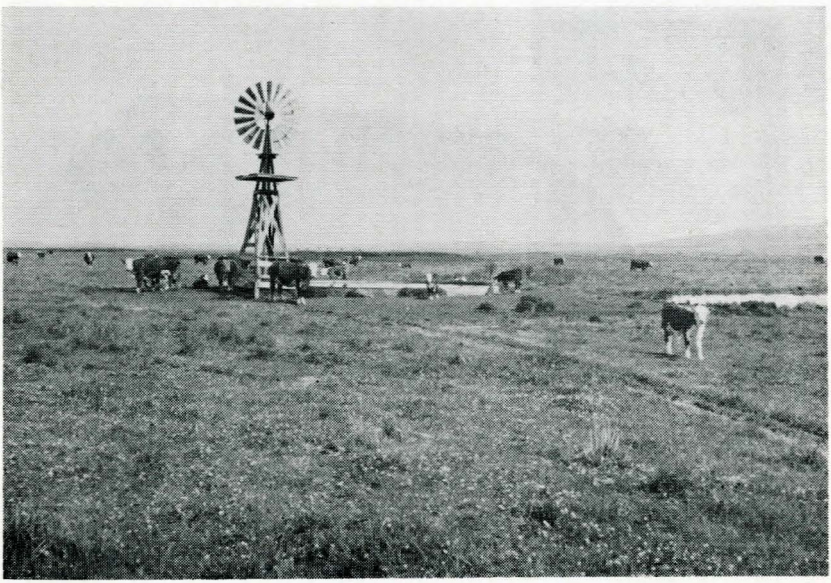
Man-made Stockwater Supplies

Wells

Wells equipped with a windmill are the most common type of water development in Nebraska. Although wells are more expensive in initial cost, they normally furnish the most dependable year round water supply. A 150 ft. well in the Sandhills area, equipped with mill, tower, and 18′ circular stock tank costs about $900 to $1,000. Where the water table is deep and few springs exist, wells may be the only feasible source of permanent water.

Wells have a distinct advantage in that they can be drilled near the forage supply and are a safe place for livestock to water in winter. A well can serve two needs. In addition to supplying water on the site, it can be used as a source for piping water to adjacent range or even hauling in emergencies. Greater use is being made of electric or gasoline engines as a source of power to supplement the windmill.

Throughout the Nebraska Sandhills, ground water is plentiful. However, in extreme northwestern Nebraska and on bedrock outcrop areas, reliable water sources are found only at deeper depths. Even then water may be of poor quality. Before drilling a new well in a high risk area, check the probability of dry holes and the performance and depth of existing wells in the vicinity. Also, seek advice from an experienced well driller or from state geologists.



Stockwater well in Cherry County with windmill, circular tank and overflow reservoir. (SCS Photo)

Reservoirs and Dugouts

Reservoirs and dugouts are valuable as temporary or seasonal sources of stockwater. Properly located and constructed reservoirs can sometimes be made to furnish a year long water supply. A reservoir is formed by means of an earth fill across a narrow channel or valley.

The dugout, also referred to as a "water hole," differs from the reservoir in that most of its capacity comes from excavation.

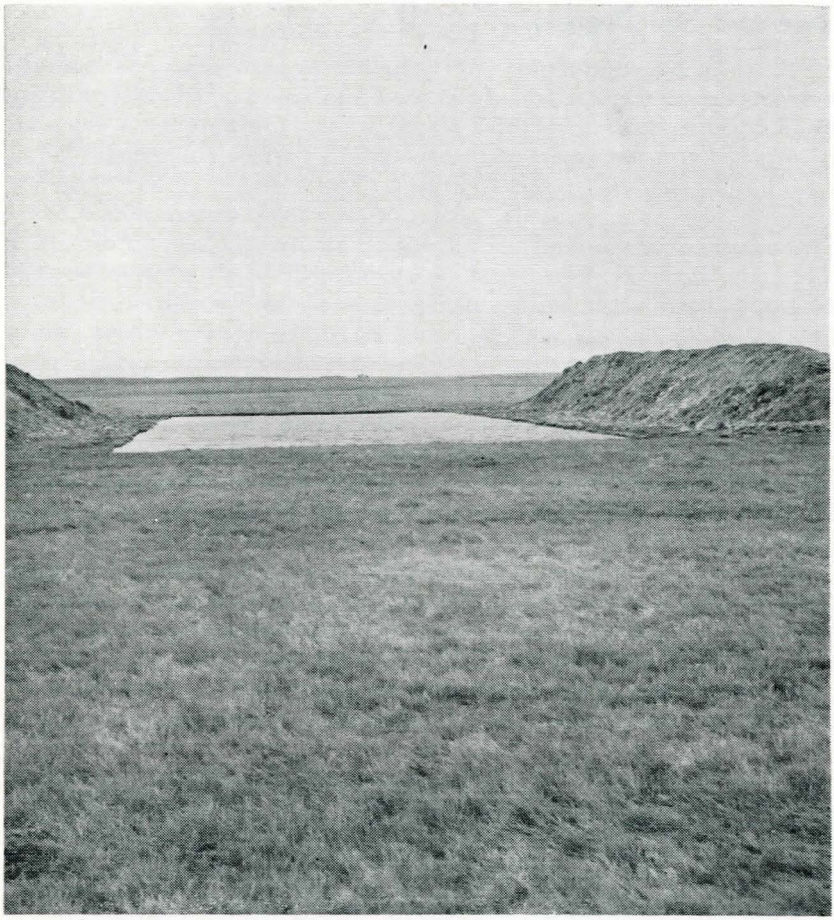
Both the reservoir and the dugout are relatively cheap to construct. They are, however, dependent on surface runoff or seepage, so may be empty when most needed in dry seasons. Both require a drainage area adequate in size and protected against excessive silting. Make reservoirs and dugouts deep enough to prevent excessive evaporation. Construct them on heavy clay or adobe soil to prevent seepage loss.

Provide each reservoir with a spillway big enough to carry away excess water. Place the spillway three to four feet below the top of the embankment. Fence off the reservoir and pipe water to a trough located outside the fence. Detailed construction plans are given in several publications (1, 8).

The dugout is a temporary water source adapted to flatlands where some overland flow occurs. The dugout is best suited to locations where a comparatively small water supply is sufficient and where the soil is impervious. Diversion ditches into the dugout are often needed.

Small patches of gravel or sand in a reservoir or dugout can be covered with a blanket of clay soil, three to five inches deep to prevent

Stockwater reservoir showing willow rip-rap on face of dam to protect against wave action. (SCS Photo)



Dugout for stockwater in South Dakota. (SCS Photo)

leakage. Reservoirs and dugouts can be sealed against leakage by spreading bentonite clay in the basin and up to slightly above the maximum water line. Apply bentonite of medium swelling ability at the rate of one pound per square foot and mix well with the top few inches of soil. Wet and pack with a smooth roller (11). The use of plastic or butyl rubber liners to prevent seepage from open stockwater reservoirs has not proven practical.

Salting livestock in the reservoir basin before it fills with water will help reduce seepage losses because the animals will trample and puddle the soil. Broadcasting or disking-in granulated salt on the reservoir basin will also help in puddling the soil, provided the soil has a moderately high clay content. If used for puddling soil, salt should be applied at the rate of 1 pound to each 5 to 10 square feet.

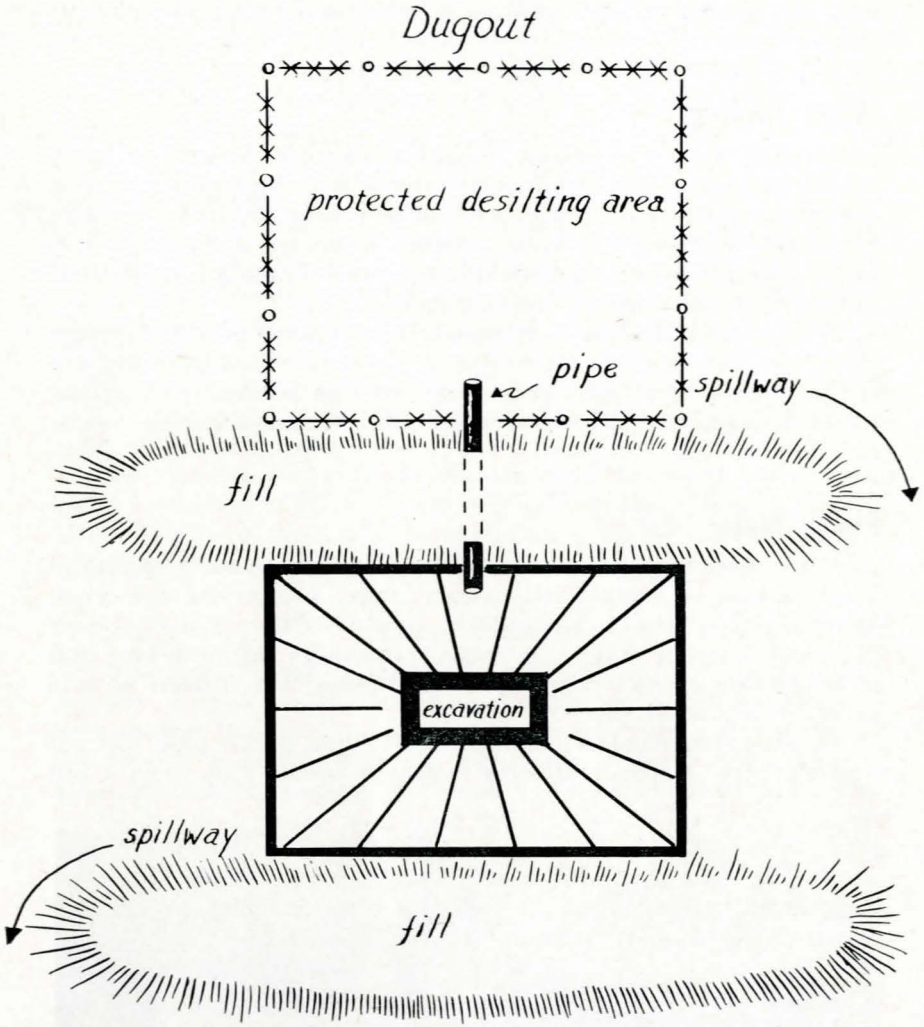


Diagram for dugout construction. (Courtesy University of Wyoming)

Sand Tanks

A sand tank is made by placing a small dam across a sand wash. To minimize seepage, the dam should be built within a rock-bound channel and bonded to bedrock. The sand tank takes advantage of the fact that water can be stored in the sand trap above the dam.

Twenty-five to 30 percent of the volume of sand is available for water storage (12). Pipe water away from the collection box to a tank. Construct the collection box of loosely joined rocks at the base of the upper side of the dam. Sand tanks have an advantage over reservoirs in

that they greatly reduce evaporation and avoid silting in following heavy storms.

Water Hauling

Hauling water to livestock in tank trucks may be used in emergencies or to provide a temporary water source. Water hauling as a continuous practice on rangeland is seldom required or practical in Nebraska. Since water hauling is time consuming and costly ($1.00 to $1.25 per cow month), it should be used only where it is impractical to develop other types of watering facilities (4).

Where water hauling is required, light weight, portable troughs shaped for easy stacking allow you to place water anywhere there is an unused source of feed, providing it can be reached with a tank truck. This practice provides a top means of maintaining good stock distribution.

Piping Water

Water may be piped distances of two to five miles from central water sources to areas where natural water sources do not occur. Flexible plastic pipe is particularly well-adapted to laying pipeline over rough terrain. Take care that opportunities for air-locking and sedimentation are not provided along the line. Use a dozer or subsoiler to lay plastic pipe.

Occasional freezing of water partially filling plastic pipe will not hurt the pipe. However, freezing may split plastic pipe when a full

Plastic pipe for carrying stockwater being laid in trench 18 to 24 inches deep and dug by a tractor-mounted subsoiler. (SCS Photo)

column of water remains in the pipe. This damage occurs most often near fittings. Bury plastic pipe 30 inches below the ground surface to reduce exposure to sunshine as well as cold temperatures. Do not use plastic pipe where gophers are present because of the damage these rodents can cause.

Catchment Basins

Catchment basins or "guzzlers" are a new type of stockwater development in use in Utah and Arizona where it is difficult to supply adequate stockwater. This structure intercepts and collects rainwater by means of a sloping, fan-shaped, paved surface and channels water into a storage facility. The water source is the precipitation falling directly on the collection area. This type of water development is best adapted to cattle use in areas of summer rainfall and least adapted for use in winter.

Cost estimates compiled at Utah indicate that water can be provided for about $1.03 per 1,000 gallons in an 18-inch precipitation area (9). This is equivalent to about 60c per cow month during a 6-months summer grazing season.

Storage Facilities

Unless natural flow is enough to promptly supply the maximum amount of water needed, you must provide stockwater developments with storage facilities. The amount of storage capacity depends upon the type of water development, uniformity of water yield, kind of livestock using the facility, and number of stock watering at one time.

When sheep water as a band rather than as individuals, larger storage facilities are needed than for cattle, which normally water singly or in small groups. Water sources which provide irregular or erratic flows of water, such as reservoirs or catchment basins which depend upon storms of moderate intensity, require larger storage facilities.

Storage facilities may consist of metal, cement, or masonry tanks or cisterns. You can use plastic or butyl rubber to line cinder-block or masonry structures. Collapsible butyl rubber bags can be purchased for use with catchment basins. Sixteen-hundred-gallon bags cost about $200 each; a 3,000-gallon size costs about $350.

Deep pits or reservoirs can be lined with plastic or butyl rubber and covered over with the same material to prevent both leakage and evaporation. A monomolecular alcohol has also been used experimentally on open reservoirs, reducing water evaporation by 25 percent (13).

Watering Facilities

Many types and shapes of watering troughs and tanks are used successfully on the range. Most are constructed from wooden planks,

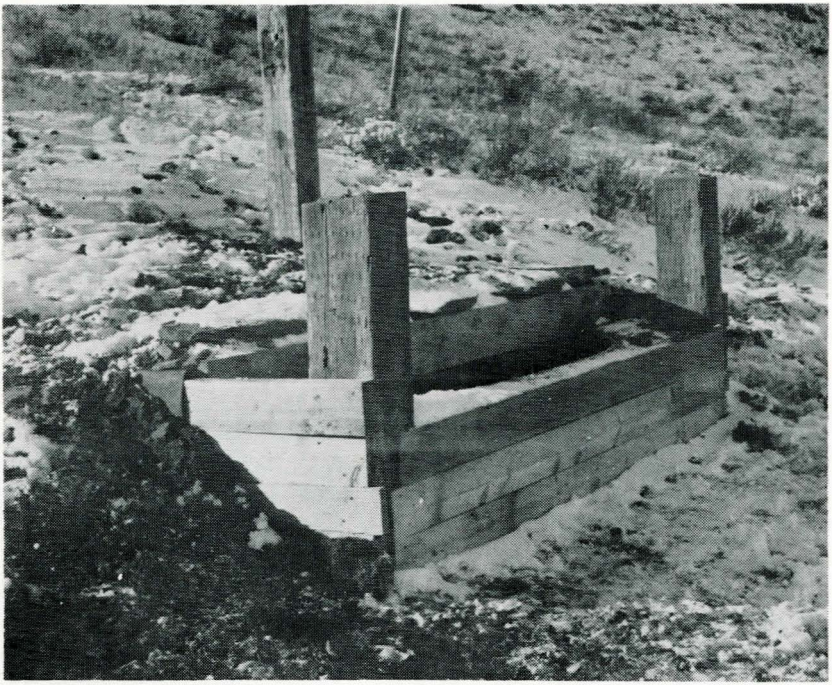
Stock tank with float and valve below fenced reservoir. (SCS Photo)

cement, masonry, or heavy metal. To be effective and require minimum maintenance, watering facilities should be constructed of strong materials, be well reinforced and have adequate supports. They should be firmly anchored to the ground and sealed against leakage.

Since cattle water individually or a few at a time, a 10-foot elongated trough provides adequate head room. When sheep water as a band, a much larger trough must be provided. Troughs used by sheep bands should not be less than 75 feet long (12). Trough or tank tops should not be higher than 16 inches above ground for cattle or 10 inches above ground for sheep (10).

Locate tanks on well-drained sites of easy access to stock. Hauling in broken rock or gravel around the tank may be necessary. A tank located along a division fence allows stock on both sides to make use of it. Supply corrals with stockwater if possible, particularly where stock may be left overnight.

Stock tanks or troughs supplied water from storage tanks should be equipped with a float valve to prevent waste while maintaining a full water level. If the amount of water coming into a tank is not controlled, provide an overflow to carry away excess water and prevent formation of mud holes. You can pipe the overflow to a supplementary tank or to an open reservoir, or both. Clogging of the overflow can



Tank near spring development set in the ground and partially covered to prevent freezing during winter. (SCS Photo)

be prevented by providing a U-pipe on top of the standpipe with a hole bored in the top to prevent airlock.

Aids to Ranchers

Information on getting water samples analyzed and on precautions to follow in developing domestic water supplies can be obtained through your County Extension Agent. Personnel of the S.C.S. can give on-the-ground assistance in providing construction specifications for various stockwater developments.

Cost-sharing assistance is available through the county A.C.P. program for developing stockwater on private lands. If you hold grazing permits on federally owned land you can usually obtain assistance in developing additional needed stockwater supplies. Ranchers planning to construct water developments on state lands should obtain construction permits to protect their investments.

An application for a water right must be filed with the Nebraska Department of Water Resources and approved on any stockwater dam or reservoir that impounds water to a depth greater than 10 feet or to a volume greater than 15 acre feet. No restrictions are placed on stockwater wells and no applications are required.

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