An above-ground gravity flow water system covered with sotol and rock.

ing rut formation and excessive erosion. Abandoned roads are cross-dammed and seeded with Johnsongrass and almum sorghum *(Sorghum almum)* to provide forage, cover, and erosion control.

A true multiple-use approach based on forage production and animal use and density has been developed for the Glass Mountain Ranch. After observing the response of seeded areas, after 4 successive wet years, Sibley suggested the use of yearling steers between the months of November and May. The current stocking rate is 25 animal units per section. Sibley refers to the system as litter management and winter grazing. He says: "The system promotes plant growth by maintaining a balance between plant and animal needs and has enhanced range condition by livestock exclusion during the growing season." Sibley's concept of management also includes wildlife. Before 1974, only antlered deer were harvested. However, personnel of the Texas Parks and Wildlife Department have persuaded him to reduce the buck harvest and increase doe permits to attain a 1:3 sex ratio. Harvest is based on results of spotlight and mobile census lines originally established by state wildlife biologists. Sibley now conducts the census and determines the harvest.

Tremendous amounts of time and money have been allocated for range improvement and management, but Sibley stresses the need for more. Current plans include a canal system that will divert surface flows from active erosion sites, water spreading on future root-plowing sites to increase infiltration and fencing to exclude livestock from active erosion sites. Sibley believes that nothing should be wasted or abused, and has research plans to determine the usefulness of "undesirable" range plants. He plans to evaluate the fiber content of sotol, lecheguilla *(Agave lecheguilla)*, and yucca (*Yucca* spp.) and determine their value as thermal insulation fiber. Other projects include the determination of elevational limits of jojoba *(Simmondsia chinensis)*, guayule *(Parthenium argentatum)* and the feasibility of grafting native pecans onto abundant Mexican walnut *(Juglans microcarpa)*.

The Sibley ranch is currently a "paying operation" and a fine example of multiple use and conservation of renewable natural resources. Four principles govern the management of the ranch: (1) livestock and wildlife densities are continuously monitored and stocking rates and wildlife harvests are based on plant production after the growing season, (2) energy is efficiently used in land renovation and water distribution, (3) indigenous animals and plants are cultivated, and (4) there is a constant search for exotic plant species that will improve forage and cover for domestic and native livestock.

Sibley, a retired medical doctor, has now become a doctor of range. He states: "Depleted rangeland is much like a sick patient; both must receive adequate attention and it is the duty of the landowner to provide it. For it is man's basic responsibility to care for the land and live with, not against, nature". ●

Pipelines for Grass Management

Oryl Fischer

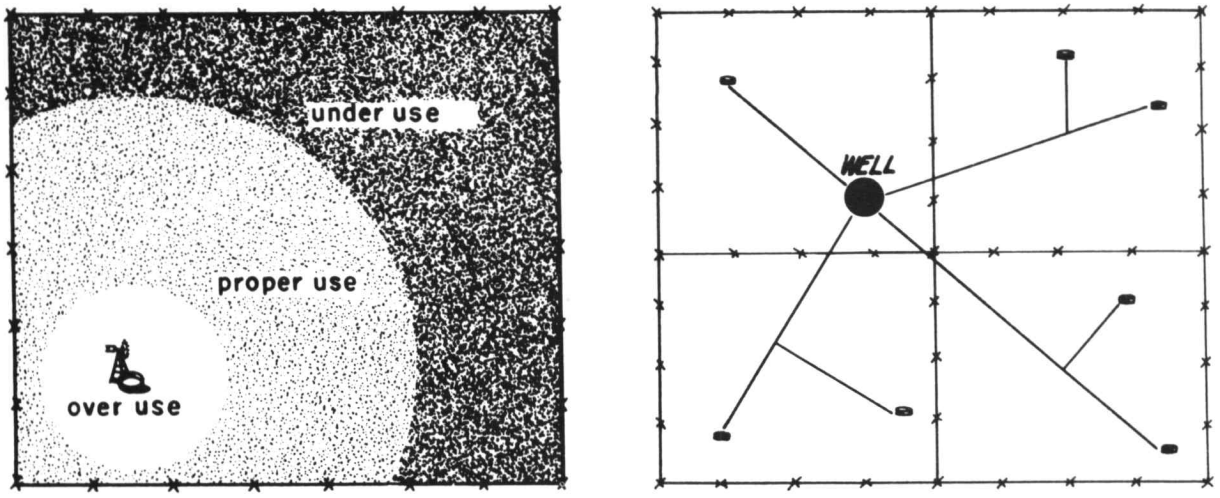
"Ranchers looking for better distribution of livestock should consider pipelines to get cattle to use more of the grasses in a pasture," said Hugh Clarke, Jr., of Berwyn, in central Nebraska. Clarke knows the benefits for he has installed nearly 19,000 feet of underground pipelines on his 1,700 acre ranch located in the Nebraska Sandhills. They were installed under a Great Plains Conservation Program contract administered by the Soil Conservation Service.

The author is with the Soil Conservation Service, Broken Bow, Nebraska.

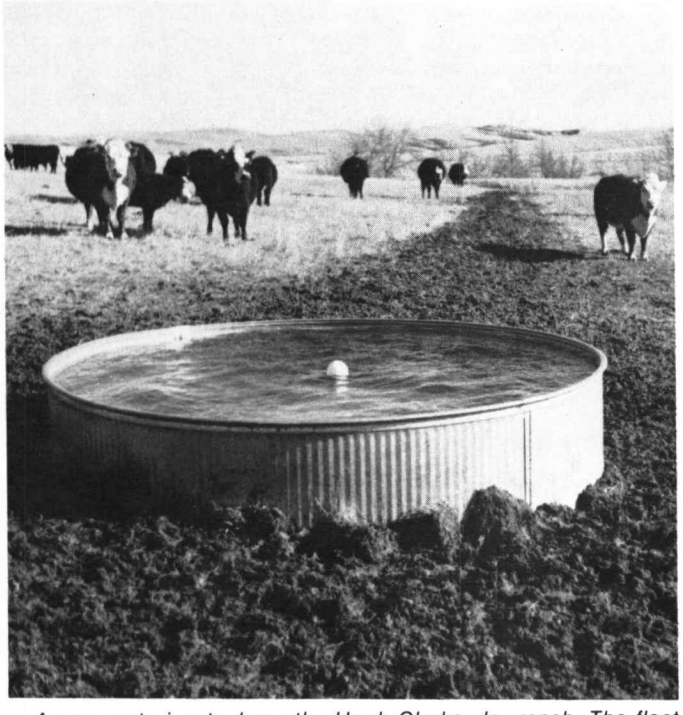
"I needed more water places because on the rough terrain the cattle weren't grazing too far from water," he said. He chose pipeline because, "They cost less than wells and there's also less maintenance than with wells and windmills."

"We did have to put in one new well to reach the outlying areas on some of the pastures", says Clarke. "The new well is 300 feet deep and will yield 13 gallons per minute. A 1 ½ horsepower motor on the pump supplies water to the tanks in eight pastures and small lots from this well."

Hugh dug a 6-inch wide trench to place the polyvinyl chloride (PVC) plastic pipe 5½ feet deep. Roughly 15,670



How grazing management works—*when a pasture is not divided as on the left, cattle will not go far from water. Grass around the well is overused, the next area receives proper use while the grasses farthest from the well are underused. Hugh Clarke divided his pasture as on the right, forcing his cattle to eat the other grasses. The buried pipelines carry water to the various parts of the pasture. While one pasture is being grazed, the other pastures are rebuilding their grass supplies. This is just one of the many ways that better use of a pasture can be made through a planned grazing system.—SCS drawing.*



A new watering tank on the Hugh Clarke, Jr., ranch. The float keeps the tank supplied with water. This and additional water tanks have improved the grazing distribution on the ranch.—SCS photo.

feet of the 1¼ inch plastic pipe and seven 9-foot diameter steel bottom tanks were cost-shared. In addition he installed another 3,200 feet and three tanks to supply water to small lots and fields for his horses without cost-sharing.

"I feel this plastic pipe should be good for 20 years and will last longer than steel pipe. We had to use a high-pressure pipe because of a difference of 90 feet in elevation between the high and low points in the line."

The pipelines fan out in four directions from the well to the pastures. Additional lateral lines run from the main pipelines carrying water to the new tanks.

"A shut-off valve is on each of the pipelines but a shut-off valve at each tank would improve the system," thinks Clarke. "The valves cost $25 and would allow me to turn the water off at the tank, especially those on the sidelines, when they are not being used."

The tanks are set to the side of the plastic pipelines. Thirteen feet of steel pipe is connected to the plastic pipe and then connected to the bottom of the tanks with a five-foot riser. A high-pressure float controls the water level in each tank. If a problem occurs with the tank, it can be repaired without breaking the plastic pipeline.

Total cost of the pipeline was about $13,500. When the cost is spread over 20 years and amortized at the present interest rate, the cost is $1.06 per acre or $10.03 per animal unit.

"I used every tank in 1980 and I'm satisfied with the watering system," says Clarke. "It will help improve my rangeland by providing a better distribution of grazing." ●