TECHNICAL NOTES

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

TN-RANGE-41
Remove and Destroy TN-RANGE-10 11/15/57
TN-RANGE-20 3/70

Davis, CA
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LIVESTOCK WATER

Animals obtain water from three sources: water that is (a) consumed as free water, (b) contained in the feed, and (c) made available through metabolic processes. Livestock rate of consumption of free water varies depending on the animal and its environment. Several factors that influence drinking water rates are species, size, age, sex and production of the animal; amount and content of the feed; accessibility to water; and air temperature and humidity.

Properly located, adequate, clean and dependable water supplies are essential for good grazing management and proper distribution of livestock.

Generally, stock water is developed for a year-round supply. There are, however, some opportunities for use of seasonal water supplies where vegetation can be grazed on a seasonal basis and year-round water supplies are not available.

In some locations where the expense of a single-water facility is excessive or sources of water are limited, pipelines are used to transport water to desired locations. Spacing of water troughs is less important in small pastures than in large ones. Hauling water to temporary troughs is often practical in areas where the grazing period is relatively short and other sources of water are too costly. However, Sneva et al, 1977, "suggest that if water locations were fenced for complete control, watering every other day might have merit. This could reduce the water hauled by 25%, a considerable saving with no ill effect on performance. Watering every other day, however, should not be done if the herd consists of lactating cows with calves". Limited water can reduce calf gains.

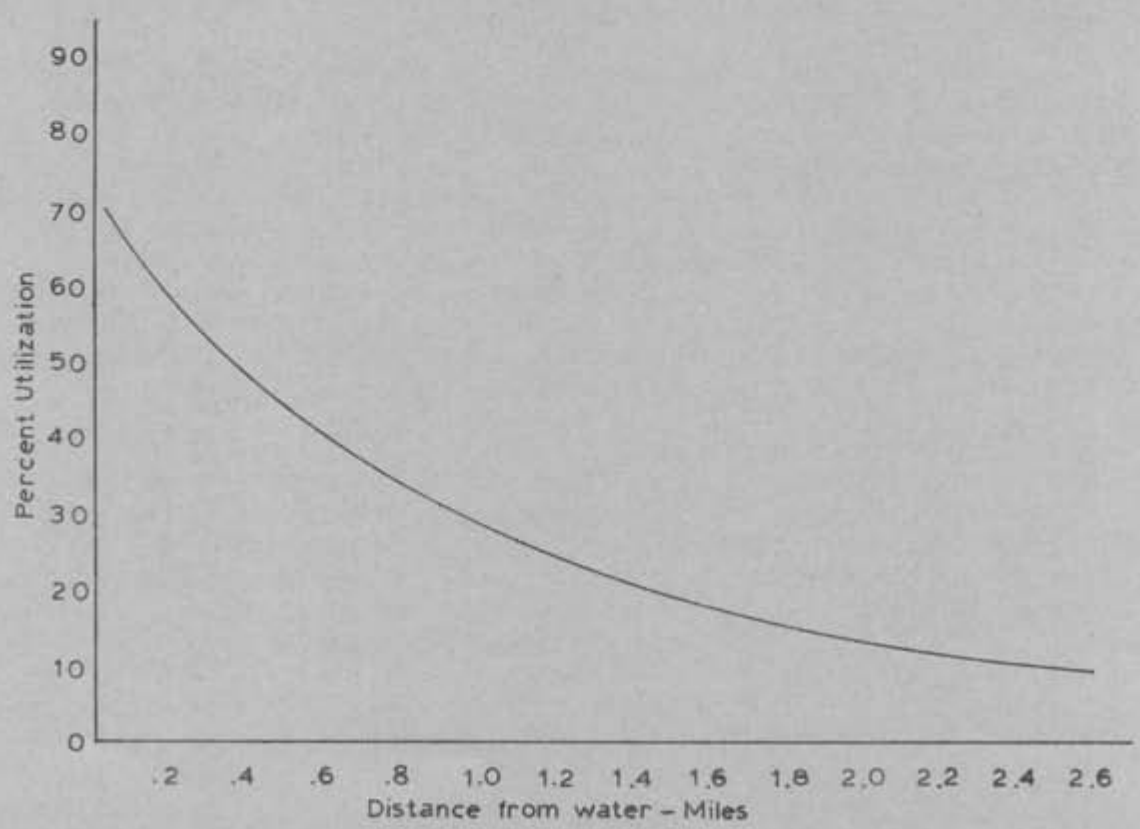
Stock water location has a profound effect on what forage livestock consume. Distant spacing of water sites distinctly limits the performance of livestock. As they travel long distances the animals become less discriminate about the forage they consume and often will eat even poisonous species. Observation will usually show a gradual but distinct increase in grazing use of forage nearer a watering location. Quite often these sites are infested with undesirable plants due to the grazing pressure and trampling. Animals that have trailed long distances to water will be hungry and on their way away from water, or while resting and ruminating near water, are likely to consume some of these undesirable species.

In a study on the effect of stockwater on cattle performance, Sneva et al, 1977 found that "allowing cattle to drink every other day or requiring them to daily trail one or two miles to water reduced water intake 25 to 35 percent of that of cattle with unlimited access to nearby water. Such water intake reductions during the summer grazing season did not cause a permanent weight reduction in yearling cattle. Lacatating cows, when similarly stressed, tended to gain weight but their calves showed reduced performance. The calf, after 3½ months of age, showed a strong desire for water and when water was withheld, performed poorly. Forcing animals to trail one to two miles every other day did not reduce water intake beyond either the every other day watering or the one to two-mile daily travel to water. It did permanently reduce the weight of heifers due to calve in the fall".

Winchester and Morris, 1956, found that "the rate of water intake per unit of dry matter ingested remains relatively constant from around 10 to 40°F., and then increases with ambient temperature at an accelerating rate.

"The decline in feed and water intake of nonlactating cattle appears to begin only after the temperature reaches 90°F. while feed and water intake of lactating cows begins to decline at about 70°F."

In a study on the use of range forage at varying distances from watering locations K.A. Valentine found that relationships as shown in Fig. 1.



A more uniform use of the forage can usually be achieved with a planned grazing system where more animals are in a pasture for a shorter period. Some of the distant parts of a pasture might be more uniformly used if the pasture were stocked during a cool season.

Other points made by Valentine as a result of his studies are:

1. Size and shape of pastures and location of watering sites greatly affect the degree of use.

2. Pastures which have about the same production of the same kind of vegetation, but which are considerably different in size, may have quite different stocking rates, if they are not equally well watered.

3. Pastures may be the same size and shape and contain the same kind and amount of vegetation and still have different use patterns, if water locations in them are considerably different.

Points made by Sneva et al, 1977.

1. In confined studies of cattle their water and feed intake are linked together, with a decreased intake of one immediately reducing the intake of the other.

2. Yearlings watering every 48 hours reduced their intake of water about 35 percent and their mineral consumption even more. Yet this reduction failed to permanently reduce their performance.

3. Cows drinking every 48 hours gained 0.38 pounds per day more than cows with free access to water, despite the reduced water intake, but their calves gained 0.51 pounds less per day.

4. Animals trailing from between one to two miles to water reduced their intake about 26 percent compared to control groups. No differences in average daily gain for cows or yearlings were attributed to trailing.

5. In a study where only the cows had access to water, the calves showed little desire for water during the first 30 days (June). During the next 30 days (July), as temperature increased and the calves grew larger and milk flow probably was reduced, the calves showed stronger desire and need for water. Note that in a 60 day study where calves had water they gained 0.4 pounds per day more than calves which did not get water.

The following items should also be considered when planning livestock watering facilities.

1. When the source is other than a pond or a stream a seven day reserve supply should be provided unless the facility is inspected on a daily basis. This means that you should have in the trough or the trough and storage facility combined, water equal to seven (days) times the number of head, times the number of gallons consumed per day (example: 7 days x 74 cows x 19 gallons (lactating cows) per day = 9,975 gallons).

2. Storage facilities (tanks and troughs) at watering locations should be of adequate size to provide enough water in a two-hour period for all animals grazing a given pasture.

3. Where drinking troughs are small (troughs holding enough water for 25%, or less, of the total number that water at the facility) the supply line from storage facility to drinking trough should be able to fill the trough at the rate of about three gallons per minute times the number of cows which can drink at the trough at one time. For example: 10 cows drinking at one time multiplied by 3 gallons per minute equals an inflow rate of 30 gallons per minute.

4. Water storage within spring developments is not advisable. It is best to pipe to off site storage. The pipe from spring to storage should exceed the capacity at which the spring is producing. Water held in the spring box seeps out. Where it is attempted to hold large amounts of water in the spring box the spring may be lost due to back pressure.

5. All troughs should have at least a 1½" drain plug to facilitate clearing.

6. Cover float valves on drinking troughs to protect from animals and vandalism.

7. Guard rails on wide troughs may be needed to keep livestock out. This will also keep smaller animals from being pushed into the troughs.

8. A ramp on the inside of the troughs will improve its use for small animals such as quails, rabbits, etc. The ramp may be made by stacking rocks against the inside wall of the trough, or it may be made of plank, steel or concrete.

9. The trough should be large enough to allow animals to drink without a lot of shoving. Rate of water flow into the trough, however, is more critical than size.

10. Aprons constructed around drinking facilities reduces mud, disease, and erosion problems.

11. Overflows should outlet at least fifteen from the apron.

12. Overflows should be located near the center of the trough and screened in such a way that loose material will not plug the pipe.

The following general guidelines pertinent to water requirements can be modified to fit local conditions:

(a) "Rule of thumb" guide for spacing livestock water facilities

Type of terrain	Travel distance, feed to water (optimum) Mile
Rough	¼ to ½
Rolling	3/8 to 3/4
Level	3/4 to 1

(b) General livestock water requirements per day

	Gallons
Cows	7.5 to 19
Sheep	½ to 2
Goats	½ to 2
Horses	10 to 12

(Add water requirements of wildlife if computing required minimum water flow or storage).

(c) Wildlife water requirements per day

	Gallons
Elk	2 to 3
Deer	½ to 1
Antelope	½ to 1

(Requirements vary according to such factors as location and season.)

Tables 1, 2, and 3 on the following pages may be used in the design of livestock watering systems.

Table 1 can be used to determine the size of pond needed for a specific number of cows, the size of pond needed to provide a certain quantity of water and the amount of water provided by ponds one-tenth acre to fifteen acre feet in size.

Table 2 can be used to determine daily water requirements for a group of cattle.

Table 3 can be used to determine the number of cows that can be watered from wells of one to seven gallons per minute of flow.

TABLE 1. WATER SUPPLY FROM PONDS

This chart may be used to determine: Size of pond needed for a specific number of cows.

Ponds/sloping bottoms : Size of pond needed to provide a certain quantity of water.

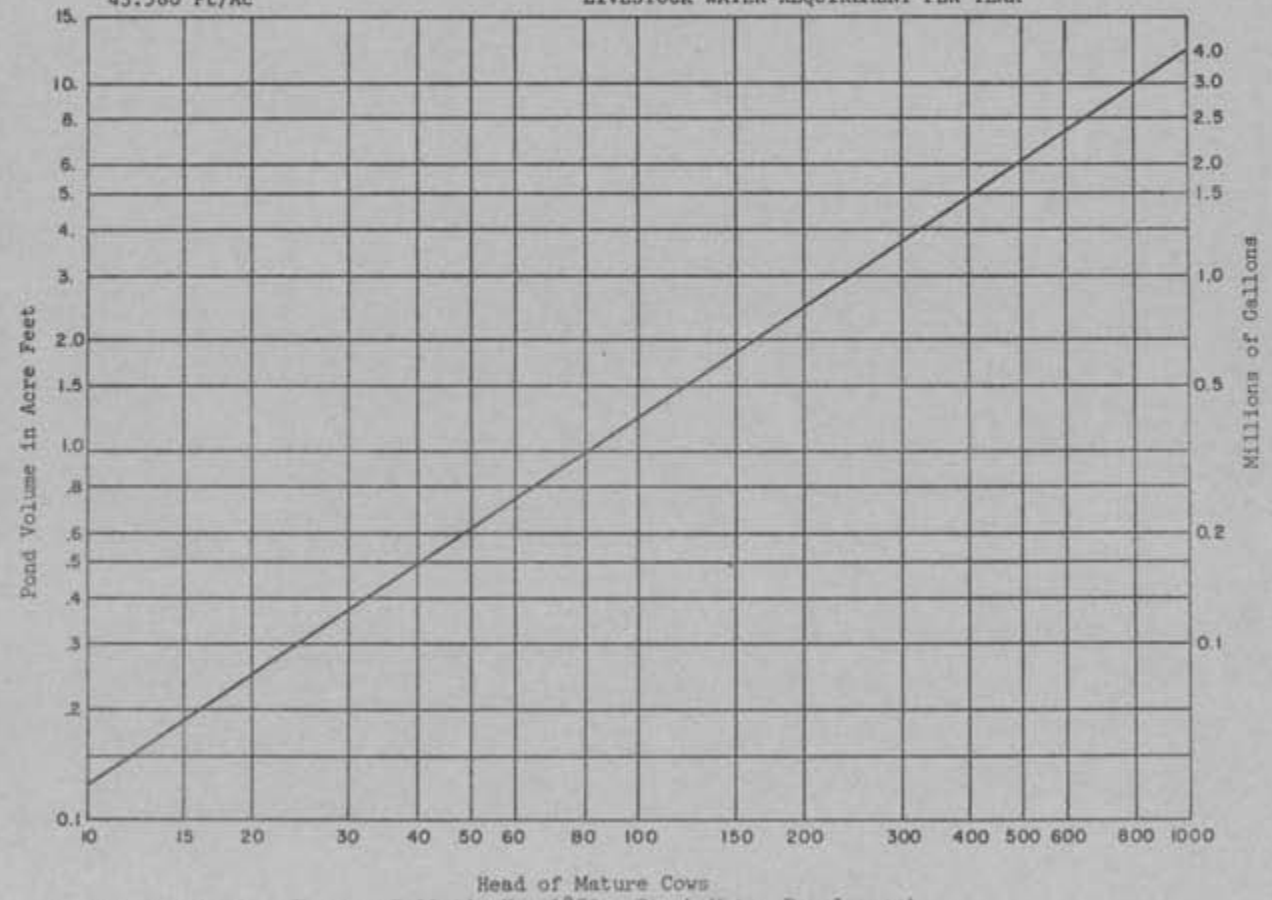
$$\frac{\text{Length x width x depth}}{4 \times 43560} = \text{Ac. Ft. Water}$$

: The amount of water provided by a pond from one tenth acre to fifteen acre feet in size.

Ponds/flat bottoms

$$\frac{\text{Length x width x depth}}{43.560\ \text{Ft/Ac}} = \text{Ac. Ft. Water}$$

LIVESTOCK WATER REQUIREMENT PER YEAR



This chart is from Farmers Bulletin No. 1859 - Stock Water Development

TABLE 2. Daily Water Requirements

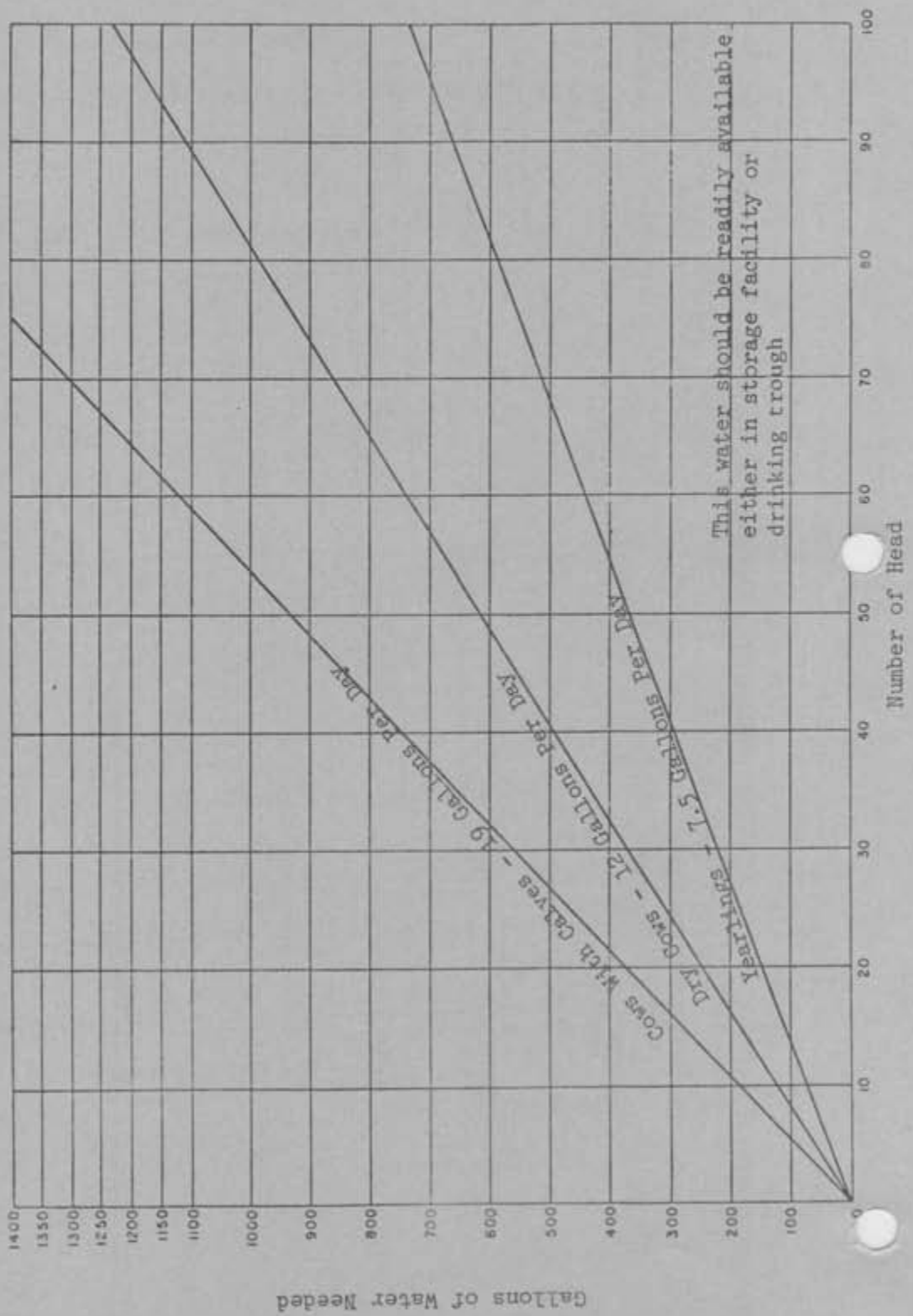
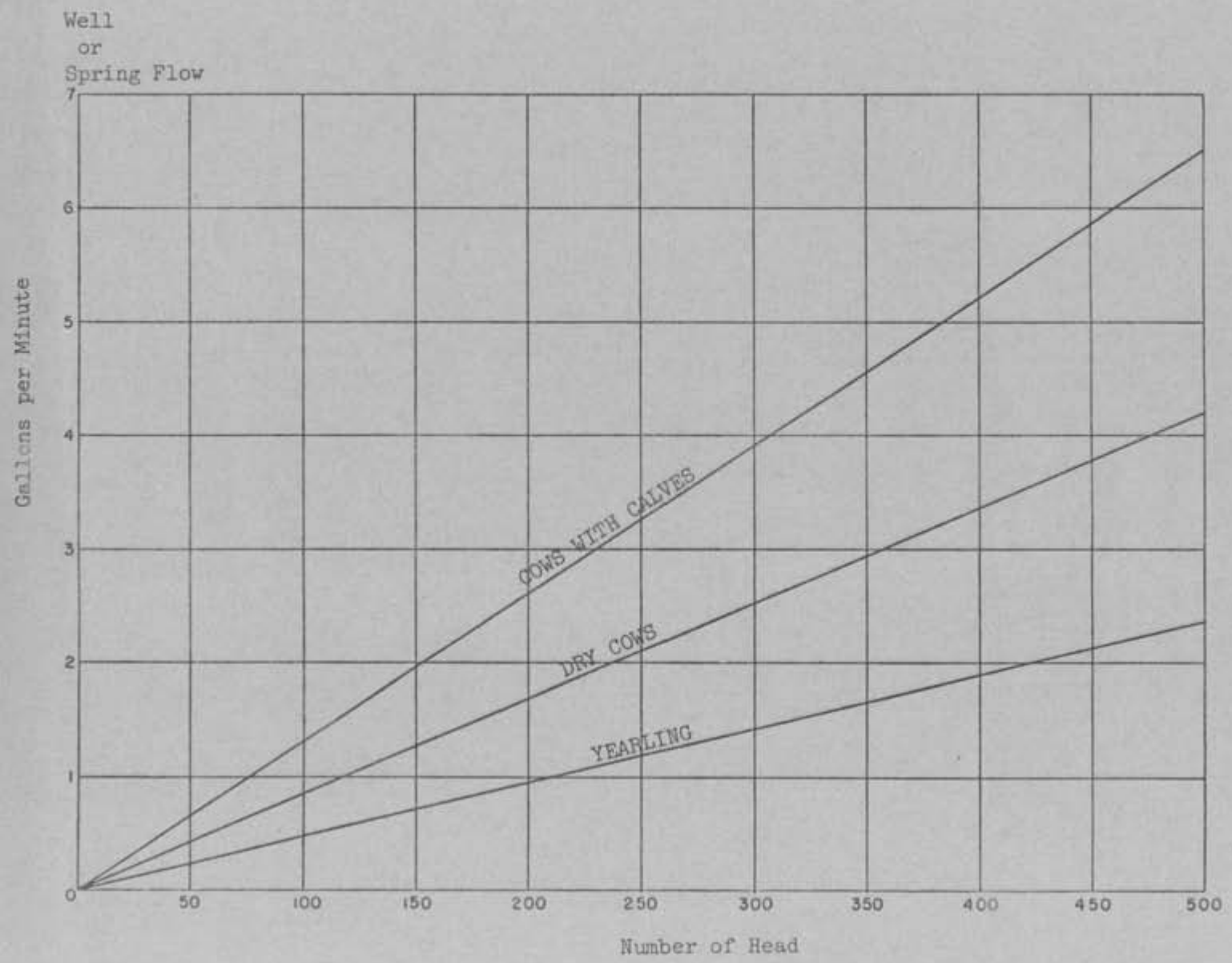


TABLE 3. Maximum Number of Cattle That Can Be Watered From Water Sources Yielding One to Seven Gallons Per Minute. Adequate Water Storage Must Be Provided To Accumulate Water For The Desired Number of Head



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