

# Livestock Watering FACTSHEET



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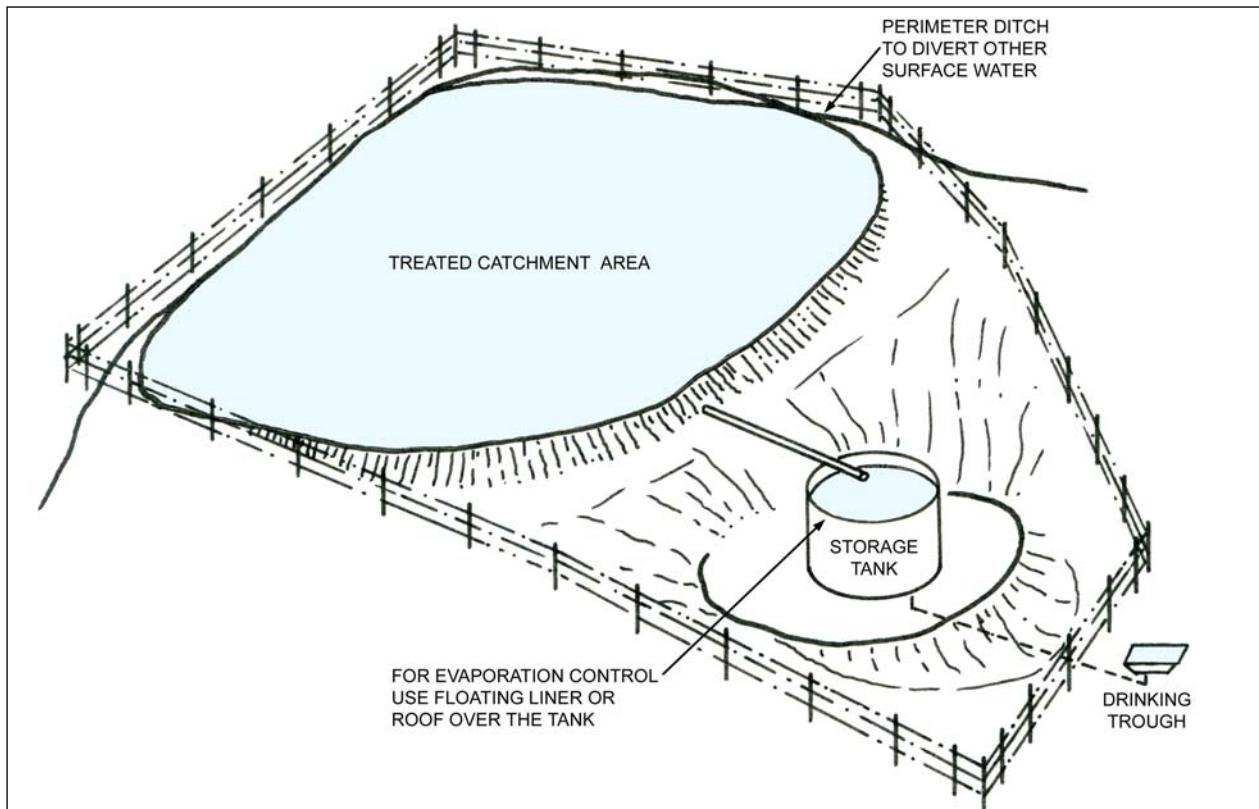
## WATER HARVESTERS Collecting Precipitation

This Factsheet outlines options to capture precipitation to use as a water source for livestock watering.

### Introduction

Water Harvesting describes the process of collecting and storing water from an area that has been treated to increase precipitation runoff. A water harvesting system can be constructed to collect and store precipitation for use by livestock. Two basic designs are typically used: treated ground surfaces or collection on roof-like surfaces. Figure 1 (below) illustrates a treated ground water harvester and Figure 2 (next page) is a catchment using a sheet metal roofing surface located at Cache Creek, British Columbia, Canada.

Ground and surface water developments should first be eliminated as possibilities as these are often less expensive. In areas where a dugout can be constructed to capture runoff that may be a better option (refer to Factsheet #590.303-3).



from: USDA "Handbook of Water Harvesting", 1983

Figure 1 Components of a Treated Ground Water Harvester



Cattle Drinking from Partially Full Collection Tank



Full Collection Tank  
Showing Floating Evaporation Cover  
and Cover Restraint Wires



Water Harvester at Cache Creek, BC  
Showing Vinyl-Lined Tank, Wooden Rail Approaches and Livestock Drinking Access

**Figure 2 Water Harvester Using Sheet Metal Roofing**

TABLE 1

## WATER HARVESTER CATCHMENT MATERIALS COMPARISON \*

		paraffin wax sprayed on soil	gravel covered membranes on soil	asphalt – fabric on soil	butyl rubber on soil	sheet metal on a frame	concrete formed on soil
catchment slope	3-5%	✓	✓	✓	✓	✓	✓
	5-10%	x	x	✓	✓	✓	✓
soil type	silt	x	✓	✓	✓	✓	✓
	silt loam	✓	✓	✓	✓	✓	✓
	sandy loam	✓	✓	✓	✓	✓	✓
	sand & loam	✓	✓	✓	✓	✓	✓
	clay/clay loam	✓	✓	✓	✓	✓	✓
surface.	rough	✓	x	✓	x	✓	✓
	smooth	✓	✓	✓	✓	✓	✓
Life years		7	15	20	15	20	20
runoff %		75+	85+	95+	95+	95+	60+

\* x = probable failure

from: USDA "Handbook of Water Harvesting", 1983

✓ = probable success

**Selecting a Site.** Many factors will affect the selection of a water harvester site. The following should be evaluated:

- the site's forage production capabilities areas of quality grazing not serviced by water
- soil type for treated ground harvesters; match to the type of catchment material
- topography for treated ground harvesters; match to the type of catchment material
- vegetation for treated ground harvesters, must be removed from catchment area
- accessibility poor access increases development and maintenance costs
- precipitation avoid rain shadow areas; encourage snow accumulation

In both designs, runoff from the catchment surface is directed into a storage tank. Livestock may either water directly from storage or from a remote stock trough. Catchment areas should be fenced from livestock and protected from possible contaminated runoff by an interception ditch.

**Types of Catchment Surfaces.** Many surfaces can be used to collect precipitation. Cost, durability and life expectancy must be considered. Options range from soil treatments to sheet metal. Soil treatments must be selected for the soil type and slope of the site. Surfaces like sheet metal can be adapted to most any site but are more expensive. Table 1, above, compares catchment materials.

**Site Yield.** To determine the approximate water yield that can be expected from a site, the precipitation must be known. Monthly averages can be obtained from weather records. With evaporation control, precipitation can be stored for a full year and used to water stock for a short grazing period.

The following equation will give the approximate annual yield of a Water Harvester:

$$A = 1.8 \frac{R}{P}$$

where

A = catchment area, ft<sup>2</sup>

R = annual water requirement, US gal.

P = average annual precipitation, inch

and net yield of precipitation is assumed to be 75%

### Example – Catchment Area Estimate for a Water Harvester

A range area in Cache Creek requires livestock water for one month of spring grazing for 20 beef cattle.

What size of catchment area is required if the annual precipitation is stored?

- determine the annual precipitation for the site  
- the annual precipitation for Cache Creek is 9 inches
- determine the livestock water requirement  
- from Factsheet #590.301-1, Table 1, in spring assume 12 US gpd per cow  
- for 20 cows and one month:  
= 20 x 12 gpd x 30 days  
= 7200 US gal
- calculate the catchment area  
- catchment area =  $1.8 \times \frac{7200 \text{ US gal}}{9 \text{ in.}}$   
= 1440 ft<sup>2</sup> of catchment area

For this Cache Creek site, a catchment area of 1440 ft<sup>2</sup> will collect 7200 US gal during the year, sufficient to water 20 cows for a month in the spring.

**Evaporation Reduction.** Depending on the storage method used and the term of storage, some type of evaporation reduction may be required where cost effective:

- in Figure 1 a roof could be set over the tank
- an enclosed tank could be used
- in Figure 2 a floating cover is used on a vertical wall tank (but not favorable on sloped sided reservoirs)
- preferred sites will have low prevailing winds to reduce evaporation (consider wind breaks if necessary)
- structures must withstand wind and snow accumulation damages

### Other Information

*Handbook of Water Harvesting*, USDA Agriculture Handbook #600

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