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# 5.0 WATER SUPPLY MANAGEMENT

Site selection for cow/calf operations depends greatly on the availability of a reliable, clean water source for livestock. Water requirements vary with animal size, air temperature, diet, moisture content of the feed and water quality.

Water wells, dugouts, sloughs, streams and creeks are the most common sources of water. All water uses may be subject to licensing requirements by Alberta Environment. It is important to manage the water supply properly to ensure its longevity and quality.

The following are typical average water consumption rates recommended for cattle on pasture:

- Yearling steers or heifers – 40 litres per day (8 gallons per day).
- Cow/calf pairs – 60 litres per day (12 gallons per day).

These are average rates and on hot summer days, peak water consumption can be 1.5 times greater.

## 5.1 Know Your Water Source

### 5.1.1 Water wells

If using a well for livestock watering needs, ensure it can supply a consistent amount of good quality water. It is extremely important that the amount of water pumped from a well does not exceed the recharge capacity of the aquifer supplying the well. This can be determined by doing a pump test. If the capacity is exceeded, the groundwater will be "mined" and the operation will not be sustainable.

New wells drilled for any purpose other than household use will require a licence under the *Water Act.* To obtain a licence, contact Alberta Environment. Part of the licensing process requires proof that water supplies are adequate for the operation's needs. Also, the new water use must not have a negative impact on neighbouring household wells or wells that have a senior water licence.

For assistance with the initial assessment of groundwater potential, contact government agencies, such as Alberta Agriculture, Food and Rural Development (AAFRD) or Agriculture and Agri-Food Canada: Prairie Farm Rehabilitation Administration (PFRA), which have access to maps and water well data. Local water well drillers can also provide valuable information. In some situations, it is best to contact a professional hydrogeologist (under Engineering Consultants in the Yellow Pages).

These consultants can assess the groundwater potential for the area, supervise the drilling and testing and prepare reports necessary for the licensing process. Alberta Environment has a sliding scale of requirements for licensing, depending on the amount of water used. **See the *Groundwater Evaluation Guideline* http://www3.gov.ab.ca/env/water/Legislation/Guidelines/GroundwaterEvaluation.pdf.**

The requirements for a typical pasture well (less than 11,000 litres/day) can usually be determined by a proper pump test done by the driller when the well is drilled, and a self-done survey of neighbouring wells. Once a licence is issued, the operation will have first priority on the water supply over any other user that applies for a licence later.

**Note:** According to the *Water Act,* the well must be constructed to Alberta Environment standards. The well may only tap into one aquifer and must have the casing sealed from the top of the aquifer to the surface.

> For more detailed information on licensing, contact an Alberta Environment office through the Alberta Government toll-free line at 310-0000.

## 5.1.2 Dugouts

Dugouts are another option for supplying livestock with water. They are typically filled by collecting spring runoff or water from irrigation canals, creeks, rivers or lakes. Some dugouts are filled by groundwater. Groundwater-filled dugouts may pose a higher risk of groundwater contamination and should be managed accordingly.

The size of dugout required for a cow/calf operation varies with the water requirements of the operation, the refill frequency of the dugout, and assessments of seepage and ice thickness.

Dugouts that are only filled by spring runoff should be designed to hold at least a two-year water supply, unless an alternative source can be used to fill the dugout in a drought year. Dugouts in irrigated areas or dugouts adjacent to rivers or lakes must be at least large enough to supply water from the time the water is not available in the fall until water flows again in the spring. Planning and design information is available through PFRA or AAFRD water specialists.

Some dugouts may require licensing by Alberta Environment. Check with Alberta Environment to ensure that all legislative requirements are met when planning any of the following dugout types:

- Constructed in water body locations.
- Intercepting groundwater.
- Over 12,550 cubic metres in size.
- Using more than 6,250 cubic metres of water/year.

***Water Act***

A licence through the *Water Act* protects the licensee from other water users that may be competing for the same water. If a new water user (other than a household) has a negative impact on a cow/calf operation's water supply, the cow/calf operator will have priority for the licensed amount. When issuing a licence, Alberta Environment will ensure that the water use will not negatively affect other licensed users, household users or the watershed itself.

## 5.1.3 Water bodies

Water bodies are locations where water flows or is present year round or intermittently. They include lakes, wetlands, creeks and sloughs. Managing these waterways to ensure their health is key to a sustainable water supply. For more information on grazing practices to manage waterways and their associated riparian areas, see Section 7.

It is important to provide water to cattle at a location away from the water body. By minimizing the impact of livestock on wet, sensitive areas around a water body, water quality and quantity can be protected.

**Benefits of maintaining the health of these areas include:**

- Improves and maintains water quality. Wetlands filter and trap sediment, and reduce pollutants.
- Provides temporary storage for runoff water, to control downstream flooding and prevent soil erosion.
- Conserves and recharges groundwater and surface water supplies.
- Provides habitat for a variety of plants, birds, animals and fish that depend on water or wet soils to survive.
- Provides forage and shelter for livestock under managed conditions.

## 5.2 Preventing the Contamination of Wells, Dugouts and Streams

Alberta cow/calf producers must take a number of considerations into account when operating near a well, dugout or stream in order to prevent water contamination.

**Wells**

- Ensure wells are properly constructed and sealed.
- Locate wells upslope, away from sources of contamination.
- Decommission abandoned wells properly to prevent contamination of newer wells.
- Do not over-apply manure – nitrate seepage can contaminate groundwater.
- Construct manure storage structures so there will be no seepage into groundwater.

**Dugouts**

- Construct dugouts properly, adjacent to drainage areas and away from water runways and potential sources of contamination.
- Apply manure and fertilizers to meet crop nutrient needs. Ensure application is at least 30 metres from the dugout. Excess soil nutrients can lead to high nutrient levels in the runoff water, which causes increased algae and weed growth in dugout water.
- Contact a local AAFRD water specialist to develop a plan to protect the operation's water supply.

**Streams**

- Minimize the impact of cattle on streams and water ways for both summer and winter sites.
- Use offsite watering methods for better utilization of existing water sources.
- See Section 7.1.6 Riparian Pastures for information on managing a healthy riparian area.

## 5.3 Watering Systems

A variety of livestock watering methods are available for any type of pasture and location. Water can be moved to livestock using several options, including solar, wind, fuel, stream flow, mainline electricity and gravity flow. Selecting the most appropriate option can be a challenge.

Establish a list of priorities and use the natural advantages of the site and equipment.

**Factors to consider:**

- Type and location of available water source(s).
- Site location and conditions (remote location, topography, riparian features).
- Type of grazing system (intensive or extensive).
- Number of livestock.
- Access to power source (mainline power, solar, wind, animals, etc.).
- Pumping system (amount of lift, automated versus manual).
- Flexibility and portability.
- Reliability and maintenance.
- Temporary or seasonal water storage.
- Cost/benefit and cost/animal.
- Personal preference.
- Regulations.

## 5.3.1 Pasture pipelines

Often the most cost effective flexible water supply system is a pasture pipeline. If there is reliable water source, and power within one to two miles of the pasture, water can be delivered anywhere along that pipeline for a fraction of the cost of developing a new water source and pumping system.

**Figure 5.1 Pasture Pipelines**

## 5.3.2 Solar and wind-powered pumping systems

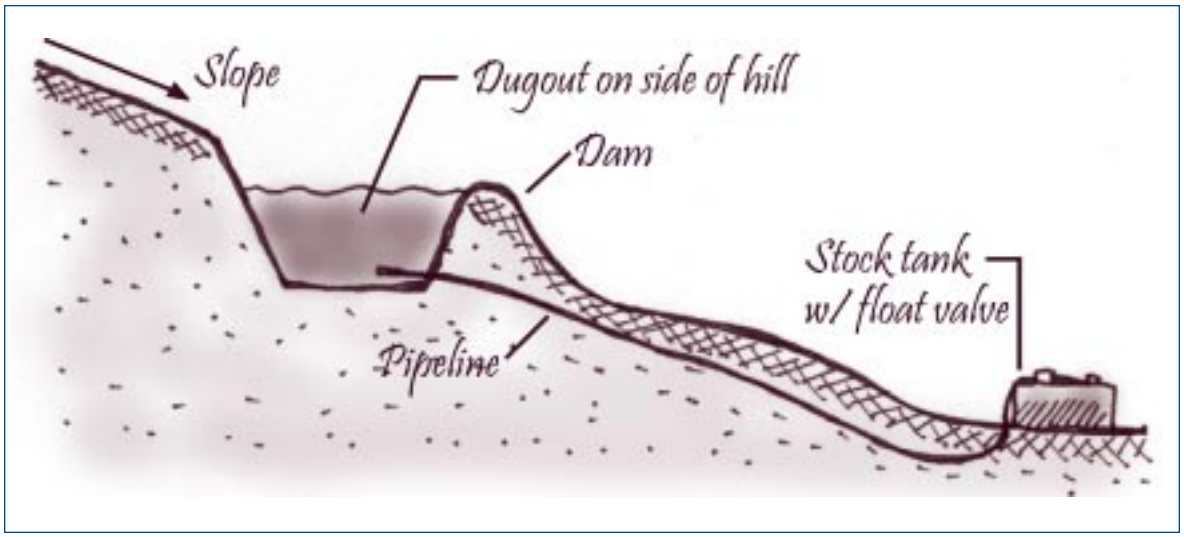
A number of solar and wind-powered pumping systems are available. It is important that these be sized to match the job. Costs can run from $1,000 to $10,000, depending how much water is needed and how high the water needs to be lifted from the source to the trough.

## 5.3.3 Gravity-fed systems

Gravity-fed systems are ideal for sloping pastureland where a dugout or dam can be located upslope from a watering site. A pipeline can be run from the dugout, downslope into a stock tank. As a rule, the water level in the dugout should be at least 1.5 metres higher than the stock tank plus 12 inches additional height for every 30 metres of pipeline to the stock tank (Figure 5.2).

Gravity-fed systems can also be used for springs where there is a sufficient elevation drop to the stock tank. On long, undulating and/or steep drops, take extra care to avoid pipeline leaks or air blockages. For assistance, contact a knowledgeable contractor or consultant.

**Figure 5.2 Gravity-fed System**



## 5.3.4 Pumped gravity flow reservoirs

Pumped gravity flow reservoirs are generally constructed by digging a small reservoir out of the dirt pile excavated from a dugout (similar to Figure 5.2). These can be constructed in a few hours with a standard backhoe. Line the reservoir with a woven polyethylene liner to prevent seepage and to keep the water clear. The reservoir bottom must be higher than the top of the stock tank. This approach will provide adequate gravity flow from the reservoir through the water line and float valve assembly and into the stock tank (Figure 5.2).

The proper size water line and high capacity, low pressure float valve are important to ensure adequate flow rates. Figure 5.4 shows the dimensions, water volumes and costs for a typical elevated earthen reservoir.

**Figure 5.3** **Pumped Gravity Flow Reservoirs**

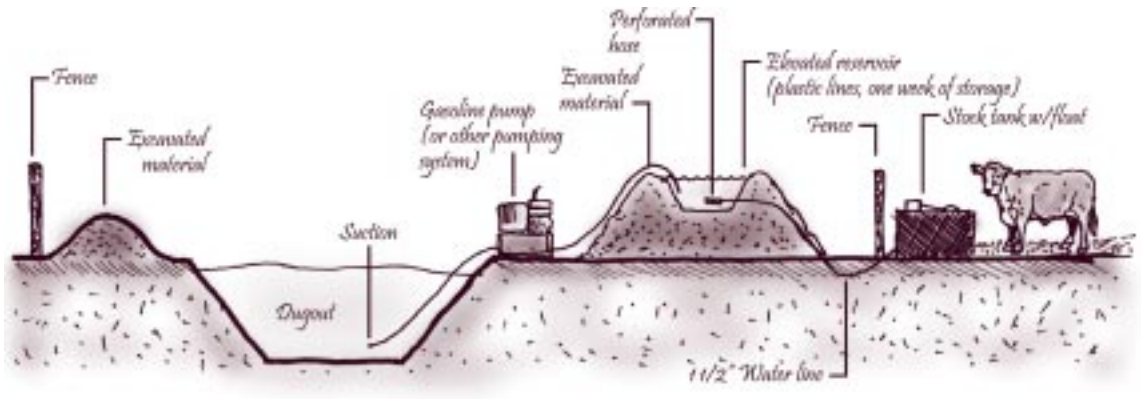



**Figure 5.4** **Elevated Earthen Reservoir Water Volume and Costs**

| Reservoir Dimensions (ft.) | | Approximate Water Volume | Estimated Costs of Reservoir and Plastic Liner |
|---|---|---|---|
| Top Length x Width x Depth | Bottom Length x Width | (Imperial Gallons) | |
| 25 x 15 x 5 | 15 x 5 | 5,000 | $350 |
| 35 x 15 x 5 | 25 x 5 | 10,000 | $500 |
| 40 x 20 x 5 | 30 x 10 | 15,000 | $650 |
| 45 x 20 x 5 | 35 x 10 | 20,000 | $800 |
| 45 x 25 x 5 | 35 x 15 | 25,000 | $1,000 |
| 45 x 45 x 5 | 35 x 35 | 50,000 | $2,000 |

Note: The woven polyethlene liner used for estimating costs is 31 cents per square foot. Reservoir water volumes are calculated using side and end slopes of 1:1. Costs are based on 2000 prices.

## 5.3.5 Nose pumps

Nose pumps, if properly installed, can be a trouble-free way to supply livestock with clean water. The pump is low cost, approximately $10 per cow/calf pair. Each pump can be used for about 30 to 40 cow/calf pairs.

Several types of nose pumps are sold in Alberta; most are for summer use. They all supply approximately one litre of water for every stroke of the nose device. The pumps can lift water a maximum of six vertical metres, and with the use of a shallow buried pipeline, can be located half a kilometre or more from the water source.

Minimizing the elevation from the water supply makes it easier for cows and calves to operate the pump. Shallow pipeline burial is recommended once the best locations for the pumps have been determined.

These pasture pumps are very reliable and systems can be set up so they can be moved from pasture to pasture. However, cattle will take a day or so to learn how to operate the pump. This training period is best done at the farmyard after calving and before the cows go out on pasture. Calves will generally not learn to operate the pumps until they are about 300 pounds. There are several options to overcome this problem. One is to fill a stock tank with water and allow only calves to have access. Another option is to collect some of the water pumped by the cows into a small tub or stock tank for the calves to drink.

**Figure 5.5 Nose Pump**

## 5.3.6 Winter water systems

In the last few years, some producers have installed winterized pasture water systems in their wintering sites. With proper planning and design, almost all pasture water systems can be modified and used throughout the winter. Winterized solar powered systems and frost-free nose pumps, specifically designed for winter use, also work well.

## 5.3.7 Access ramps

An access ramp is the minimum improvement that can be made to a water source. Ramps are most appropriate for large herds of livestock in remote locations (i.e. rangeland pastures) where animals are seldom checked or moved, and where fencing that would prohibit cattle access is impractical. Reinforced ramps provide better footing for livestock drinking from dugouts, sloughs and streams in areas with soft soil.

Access ramps require a slope of 1.5 to 2 metres for every 30 centimetres of elevation. To construct the ramp, lay down a strip of crushed road gravel preferably with sizes from 2.5 centimetres of diameter down to 10 to 15 percent fines. The gravel layer should have a minimum thickness of 30 centimetres. Start the gravel layer 3 to 4.5 metres from the water's edge and continue down below the lowest water level of the dugout. Use a small bulldozer or four-wheel drive tractor to compact the gravel.

In most conditions, especially where there is soft soil, place a plastic polygrid or geogrid under the gravel to provide added support. The material comes in three or four-metre wide rolls and can be overlapped for wider ramps.

Since the water source is usually fenced, livestock can only drink from the access ramp. Some producers have found that fencing is not necessary, because once the cattle have convenient access to water, with good footing, they will water almost exclusively from the ramp.

### 5.3.8 Water hauling

In intensive livestock grazing, cattle are sometimes moved daily from pasture-to-pasture. Access to water is often the limiting factor. By using a truck with a main storage tank and a portable stock tank, the watering source can be continuously relocated throughout the pasture, along with the cattle. This constant relocation distributes nutrients from manure and urine more evenly in the field.

**If any work is required on the bed and shores of a stream,** contact Public Lands, Alberta Environment, the Department of Fisheries and Oceans and irrigation districts, where applicable. In some cases, these agencies will need to issue permits.

*Public Lands Management Branch*
*Sustainable Resource Development*
Contact the Shoreline Management Co-ordinator or a regional office of the Alberta Government through the toll-free line at 310-0000.

*Alberta Environment*
Contact a regional office through the Alberta Government toll-free line at 310-0000.

*Department of Fisheries and Oceans Canada*

| | |
|---|---|
| Calgary | (403) 292-5160 |
| Edmonton | (780) 495-4220 |
| Lethbridge | (403) 394-2920 |
| Peace River | (780) 618-3220 |

## 5.4 For More Information

Contact the following offices for the publications listed or for more information.

**Alberta Agriculture, Food and Rural Development (AAFRD)**
Agriculture Information Centre 1-866-882-7677
Publications 1-800-292-5697
www.agric.gov.ab.ca

- *Water Wells That Last Generations.*
- *Water Analysis Interpretation* Agdex 400/716-2.
- *Quality Farm Dugouts* Agdex 716.B01.
- *Dugouts for Farm Water Supplies* Agdex 716.B30.
- *Dugout Maintenance* Agdex 716.B31.
- *Seepage Control in Dugouts* Agdex 716.B32.
- *Float Suspended Intake* Agdex 716.B34.
- *Dugout Aeration With Compressed Air* Agdex 716. B36.
- *Hydrated Lime for Algae Control in Dugouts* Agdex 716.B37.
- *Pasture Systems for Livestock, 2001* Agdex 400/716-3.

**Agriculture and Agri-Food Canada, Prairie Farm Rehabilitation Administration (AAFC-PFRA)**
www.agr.gc.ca/pfra
AAFC-PFRA District offices:

| | |
|---|---|
| Hanna | (403) 854-4448 |
| Lethbridge | (403) 327-4340 |
| Medicine Hat | (403) 526-2429 |
| Peace River | (780) 624-3386 |
| Red Deer | (403) 340-4290 |
| Vegreville | (780) 632-2919 |
| Westlock | (780) 349-3963 |
| Dawson Creek | (250) 782-3116 |

- *Water Wells That Last Generations.*