



LIVESTOCK WATERING REQUIREMENTS Quantity and Quality

This Factsheet outlines water required for livestock, with tables for estimated daily use. The information here is adapted from Alberta, Ontario, Agriculture & Agri-Food Canada and University of Nebraska factsheets.

Importance of Water

Water forms about 50 to 80 percent of an animal's live weight and is an essential nutrient. Whereas an animal may lose almost all of its fat and 50 percent of its body protein and survive, the loss of 10 percent of its body water can be fatal. A 'good' supply of water (both quantity and quality) is required for an animal to maximize feed intake and production.

Water Sources

Water is available to livestock in three main ways:

- water that is contained in feed consumed
- free access to water from natural sources or water troughs
- in the winter, free access to clean snow

Water Quantity Requirements

Livestock consume water based on the combinations of the following:

1. Kind & size of animal
2. Physiological state of animal
 - lactating cows require an extra 0.86 kg (litre) water per kg of milk (1 USgal per 10 lb [or 1.2 gal] of milk)
 - pregnant cows and growing animals 30 to 50% increased consumption
3. Level of animal activity
 - more active require more water
4. Type of diet & dry matter intake
 - dry diets require more water than moist diets such as silage or lush pasture
 - dry matter intake is linked to water (i.e. limiting water will limit feed intake)
5. Water Quality
 - palatability & salt content affects water consumption
6. Water Temperature
 - 10 degrees Centigrade desirable; from 4 to 18 degrees acceptable
7. Water trough space
 - crowding at a trough may limit water to some livestock
8. Air temperature (usually the most important, especially for outdoor livestock)
 - hot days will increase water consumption
 - Tables 1 & 2, next pages, show increased water requirement with increased air temperatures

Rule-of-Thumb

For many livestock, make initial estimates using this "rule-of-thumb":

- cool weather (below 15°C); 4 L per 45 kg animal weight (1 US gal per 100 lbs)
- hot weather (above 25°C); 8 L per 45 kg animal weight (2 US gal per 100 lbs)

Also, these two general points apply:

- lactating cows require up to twice the water of dry cows
- if hauling water during drought conditions, watering every other day could reduce water intake by 25% without ill effects

Table Values

Daily water requirements for various livestock are shown in Table 1, below, and for beef cattle by air temperature and feed intake in Table 2, next page. In all cases, allow for free choice of water without limiting intake.

TABLE 1 ESTIMATED AVERAGE DAILY WATER CONSUMPTION FOR LIVESTOCK (US GALLONS PER DAY)					
TYPE OF ANIMAL	DESCRIPTION	US GPD	TYPE OF ANIMAL	DESCRIPTION	US GPD
BEEF			SWINE (with wash water)		
cow with calf *	1,300 lb	12	farrow - finish	--	24 / sow
dry cow/mature cow *	1,300 lb	10	farrow - late wean	50 lb	8 / sow
calf *	250 lb	3	farrow - early wean	15 lb	6.5 / sow
feeder – growing **	400-800 lb	6 - 9	feeder	50 - 250 lb	2 / pig
feeder – finishing **	600-1,200 lb	9 - 12	weaner	15 - 50 lb	0.6 / pig
bull	--	12	POULTRY		
DAIRY			broiler	per 100	4.2
milking * (with wash water)	holstein	36	roaster/pullet	per 100	4.8
dry cow/replacement	holstein	12	layer	per 100	6.5
calf	to 550 lb	3.5	breeder	per 100	8.5
SHEEP AND GOATS			turkey - grower	per 100	15.5
ewe/doe	--	2.5	turkey - heavy	per 100	19
milking ewe/doe	--	3.5	OSTRICH		
feeder lamb/kid	--	2	--		
BISON, HORSE, MULE			DEER, LLAMA, ALPACA		
--			--		
12			ELK, DONKEY		
			--		
			6		

* For peak water use on days above 25°C multiply gpd by 1.5

** For peak water use on days above 25°C multiply gpd by 2

Sources: *Farm Water Supply Requirements*, Alberta Agriculture, Food and Rural Development;
The Stockman's Guide to Range Livestock Watering From Surface Water Sources, PAMI;
Estimated Daily Water Intake of Beef Cattle, Cornell University, New York State

Conversions

- lbs x 0.45 = kg
- USgal x 3.785 = litre
- 1 litre of water weights 1 kg

**TABLE 2 ESTIMATED AVERAGE WATER CONSUMPTION FOR BEEF CATTLE COWS
(GIVEN BY DRY MATTER FEED INTAKE & BY AIR TEMPERATURE)**

AIR TEMPERATURE (degrees centigrade)	AVERAGE DAILY WATER CONSUMPTION ^{1, 2}	
	kg (litres) of water per kg dry matter feed (or Imperial gal per 10 lb)	US gal of water per 10 lb dry matter feed
	@ 11kg dry matter feed per day	@ 25lb dry matter feed per day
	assuming 2½ % of body weight feed consumption per day (may range 2 – 3 %)	
over 35 ⁰ C	8 - 15	9.6 - 18
25 to 35 ⁰ C	4 - 10	4.8 - 12
15 to 25 ⁰ C	3 - 5	3.6 - 6
-5 to 15 ⁰ C	2 - 4	2.4 - 4.8
less than -5 ⁰ C ³	2 - 3	2.4 - 3.6

1 – typical 450 kb (1,000 lb) cow - young and lactating animals up to 50-100% more water

2 - these estimated daily water consumption values can be adjusted for particular conditions:

- to adjust for cow weight – your cow weight / 1,000 lbs x the Table water requirement
- to adjust for feed consumption – your daily dry matter feed consumption / 25 lbs x the Table water requirement

3 - increases of 50-100% occur with a rise in air temperature following a period of very cold temperature; eg, from -20 to 0⁰ C

Conversion: kg (or litre) water per kg dry matter feed x 1.2 = USgal per 10 lb dry matter feed

Source: *Effect of Environment on Nutrient Requirements of Domestic Animals*, 1981, NRC

Example – Spring Conditions

What is the estimated daily water consumption of a 1,000 lb cow in spring conditions of temperatures from -5 to 15⁰ C and feed intake of 2½ % of body weight?

- using the Rule-of-Thumb from page 2
- cool weather, 1 US gal per 100 lbs = 1 x 1000 / 100 = 10 US gal per day
- using Table 1
- below 25⁰C, a beef cow to 1300 lb = 10 US gal per day
- using Table 2
- a beef cow in these temperatures requires from 6 – 12 US gal per day

Answer: estimate **10 to 12 US gal per day** for a beef cow in these conditions.

Example – Summer Conditions

What is the estimated daily water consumption of a 1,200 lb cow in summer conditions of temperatures from 25 to 35⁰ C and feed intake of 2 % of body weight?

- using the Rule-of-Thumb from page 2
- hot weather, 2 US gal per 100 lbs = 2 x 1200 / 100 = 24 US gal per day
- using Table 1
- above 25⁰C, a beef cow to 1300 lb = 10 x 1.5 = 15 US gal per day
- using Table 2
- above 25⁰C, a beef cow requires from 12 – 29 x 1200 / 1000 US gal per day
= 14 – 35 US gal per day

Answer: estimate **15 to 24 US gal per day** (with possible 35) for a beef cow in these conditions.

Water Quality Requirements

Water quality affects the quantity of water consumed, and in turn, the quantity of feed consumed. If the water quality is in question, assess it by a lab water analysis. For acceptable levels of the following substances see Factsheet 590.301-2 *Water Quality and Cattle*, at www.agr.gc.ca/pfra/water/facts/wqcattle.pdf

The following is an outline of the main quality concerns with livestock water. Most ground and surface waters are satisfactory for livestock, however, where water quality is a problem, it is commonly excessive salinity.

Salinity. Salinity is measured as the concentration of dissolved salts, predominantly calcium, magnesium and sodium chloride. Animals have some ability to adapt to saline water if allowed time to become conditioned to it.

Nitrates. Nitrates must be considered together with nitrites. While nitrate toxicity from water is unusual, the combination of nitrates in feed plus those in water can be of concern. In ruminant animals (i.e. dairy, beef cattle and fallow deer), bacteria in the rumen will convert nitrate in the feed or water to nitrite which can diffuse into the blood stream causing respiratory distress and possibly death. The conversion of nitrate to nitrite is not a major problem with monogastric animals (i.e. swine, horses).

Alkalinity. Most waters are alkaline, but very few are too alkaline for livestock. Alkalinity is commonly expressed as pH; 7.0 is neutral, below that is acidic, and above is alkaline. Most waters used by livestock are mildly alkaline with a pH between 7.0 and 8.0.

Pesticides. It is recommended that the Canadian guidelines for pesticides in drinking water be used as the maximum limits in livestock water. This will provide a margin of safety for livestock as well as preventing unacceptable residues in animal products. Data for toxicity of pesticides to animal life supports the suggestion that, if a surface water supply supports a population of fish, the water should be safe for consumption by livestock because of the relatively high sensitivity of fish.

Bacterial Contamination. Livestock water should not be contaminated with manure, sewage or surface run off. Most water has some level of bacterial contamination, but not generally at levels to harm livestock. Coccidiosis in calves can occur. Using a water trough (generally raised above ground) that is kept clean will reduce the potential for bacterial contamination.

“Blue-Green Algae”. Common green algae are not poisonous, but a few strains of “blue-green algae” (not algae but *cyanobacteria*) occasionally cause sudden death in livestock. These are very small organisms which grow in or on the water surface. Hot, dry weather in summer and early fall enhances their growth in dugouts, ponds and shallow lakes. Heavy growth can occur in stagnant or slow flowing water. Although invisible to the naked eye, when they occur in a dense “bloom” they give the water a **blue-green discoloration** (note that cyanobacteria may be olive, dark green or even purplish in colour).

These organisms can multiply at a rate that is too great to support the population and then die off very rapidly. **Toxins develop as the organisms die.** These toxins are harmful to livestock if ingested through drinking or through skin contact. Also, water that has been treated for control cannot be used to water livestock for 24 hours due to the toxin release.

Cyanobacteria will often be blown by light breezes into shore causing concentration in locations where cattle are drinking. Occasionally calves get poisoned drinking in the shallow edges of a lake whereas cows that wade out to drink from deeper water are not as affected.

Two types of animal deaths occur. Fast death type can develop as quickly as 30 minutes after consumption of the toxin. A 450 kg (1000 lb) cow need only consume 25 litres (6 gallons) of bloom. These toxins affect the nervous and muscular systems, resulting in muscular twitching, staggering, prostration and convulsions, terminating in death due to respiratory paralysis.

Slow death type may occur after several hours or days. This toxin causes severe liver damage. Animals that recover may exhibit jaundice and diarrhea. On exposure to sunlight, some recovered animals may develop inflammatory lesions on the light skin of their teats and around their eyes, which may indicate impaired liver function. Animals that did not appear to be affected at the time others were can develop liver problems when under stress at a later time, such as in over wintering conditions.

Refer to Factsheet 590.301-3 *Algae, Cyanobacteria and Water Quality*, at www.agr.gc.ca/pfra/water/facts/algcyano.pdf

Toxic Elements. Rarely is livestock water contaminated by toxic elements such as arsenic, mercury, cadmium or radioactive substances. Analysis for these is not normally done and must be specifically requested.