Livestock Watering
FACTSHEET

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Ministry of Agriculture and Lands

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ENHANCING LIVESTOCK WATER QUALITY

This Factsheet outlines options to improve the quality of on-farm livestock water sources and water storages.

Water Treatment versus Enhancement

Water treatments methods, such as filters, distillers, and membranes, etc, (typically used for domestic water use) are higher level processes than enhancement methods. For information on these, refer to: http://www.agr.gc.ca/pfra/water/treatment_e.htm

This Factsheet looks at some options to improve or enhance livestock water quality. These methods assist natural processes in purifying and extending the life of water sources, such as dugouts and wells and could be categorized as 'preventative maintenance'. The following options are best suited for water supplies stored and used on private land. In these self-contained water supplies, no other users of the water are affected. Where the water source is a lake or stream having other uses, notably fisheries, chemical water enhancements are not usually appropriate and should not be done.

Although proper siting and construction can reduce the deterioration of stored water supplies by new nutrients flowing into the water, actively growing plants or bacteria, regular maintenance is required. Discoloration, foul odors or taste and the clogging of piping or fixtures can be controlled with a regular schedule of maintenance as is done with domestic water supplies. Depending on the water source, a combination of aeration, mechanical cleaning and chemical treatment may be required. Table 1, below, outlines some basic enhancement methods.

TABLE 1 WATER QUALITY ENHANCEMENT METHODS

Water Problem	Enhancement Method	Enhancement Dosage		
Iron Bacteria	Chlorine (bleach)	see TABLE 2, next page		
Algae	Bluestone (copper sulphate)	soft water	hard water	very hard water
		0.3 ppm	0.6 ppm	1.3 ppm
		1 ppm = 1 part per million 1 ppm = 1 lb per 120,000 US gal or 1 kg per 1,000,000 litres		
Algae, Turbidity	Lime (calcium hydroxide)	100 - 200 lbs per 120,000 US gal		
Aquatic Plants, Algae	* Reglone A (diquat)	see Field Crop Guide		
Odours, Algae, Iron Bacteria	Aeration	1 cubic foot minute per 120,000 US gal		
Turbidity	Alum (aluminum sulphate)	10 lbs per 120,000 US gal		

* A pesticide applicator's certificate is required for the purchase and use of Reglone A.

Turbidity

Turbidity is a measurement of the obstruction of light passing through the water due to suspended material. Water may be dark in color but still clear and not turbid.

Enhancement Options. Proper siting and runoff management are the best ways to control this but the organic material or silt that causes this cloudiness can be settled out by the application of various compounds. If the water does not clear up by itself, alum (aluminum sulphate) or lime (calcium hydroxide) can be used for this purpose. Try varying dosages in a 5 gallon pail, but a typical dugout will require 10 lbs of alum per 120,000 US gallons. Allow 48 hours before using the water.

Iron Bacteria

Characterized by red/brown stains, iron bacteria do not present a health hazard, but can clog pipes and valves and make the water unpalatable. Iron bacteria thrive in water which contains low amounts of dissolved oxygen, very low amounts of dissolved iron and with a temperature range of 5^{o}-15^{o}C. Water wells will almost always provide these conditions. Iron bacteria also create an environment which encourages the growth of sulfate reducing bacteria, some of which can produce hydrogen sulfide or "rotten egg" odor. Others produce small amounts of sulfuric acid which can corrode well casing and pumping components.

Enhancement Options. Shock chlorination of the water is recommended for iron bacteria control. Use Table 2, below, for mixtures that give the recommended 200 ppm concentrations. This mixture is flushed into all of the system and allowed to sit a minimum of 12 hours. After this period of time, the system is flushed clean and is ready for use again. Shock chlorination should be performed twice a year, each spring and fall, for water with an iron bacteria problem. Regular use of this process will maintain iron bacteria concentrations to tolerable levels.

TABLE 2 SHOCK CHLORINATION FOR IRON BACTERIA CONTROL

The following chlorine concentrations are approximately 200 ppm (2.67 oz/100 gal) or (200 mg/l)

Chlorine Source	Mixture
5% chlorine bleach	3 pints/100 US gal water
12 - 17% chlorine solution	1 pint /100 US gal water
25 - 30% chlorine powder	2/3 lb /100 US gal water
65 - 75% chlorine powder or tablets	1/4 lb /100 US gal water

Algae

Algae are tiny organisms that occur naturally in water. They are grouped by their colour, mostly green but also brown, red, orange or yellow. “Blue-green” algae are actually bacteria; refer to Factsheet # 590.301-3 for more information.

Enhancement Options - Public Water Courses. Chemical control is not possible in public water courses, so access control is the only possible method of stock protection. Shallow lakes which often have "bloom" conditions may have to be fenced off from animals. Non-affected water from the deepest areas can then be pumped to waterers. This may be expensive and limited by the available energy sources to power a pump.

Access can also be limited, to a degree, by keeping watering locations free of the floating algae. Log booms placed to protect a small bay, for instance, may be an alternative although one which would require careful monitoring.

Enhancement Options - On Farm Water Supply. Maintenance is the first step in controlling algae. Measures to be taken include:

- keeping livestock area run-off out of the dugout
- not allowing animals to drink directly from the dugout
- keeping leaves, grass and hay out of the dugout
- not using excessive amounts of fertilizer close to the dugout
- maintaining grassed waterways feeding into the dugout

Lime (calcium hydroxide) and copper sulphate (bluestone) are the most effective chemicals used to control algae in farm ponds.

Copper Sulphate (Bluestone). Cooper sulphate, or bluestone, is an effective algae control chemical that is not toxic to man or animals in the concentrations used for water enhancement. It is, however, toxic to fish and for that reason is NOT suitable for use in fish bearing waters. Copper sulphate should not be used on any public waters (such as creeks or lakes) without approval from the Water Management Branch, Ministry of Environment.

While copper sulphate is safe in the concentrations used for algae control (0.1 to 1.0 ppm) it is highly toxic to humans and animals in a concentrated form. Use caution when handling or spraying strong solutions and limit use of any treated water for 24 hours to ensure the chemical has completely dispersed leaving no areas of high concentration. In addition, treated water cannot be used by livestock for 24 hours as a toxin develops as the algae dies.

Copper sulphate concentrations which are effective in controlling algae vary according to the following conditions:

- concentration of algae
- type of algae
- amounts of other organic matter present
- water temperature
- exposure time of algae to the chemical
- hardness or mineral content of the water

For most cases, a maximum concentration of one part per million (1 ppm) will provide effective alga control. This concentration is obtained by dissolving one pound of copper sulphate in 120,000 US gal of water.

Applying Copper Sulphate. Copper sulphate should be applied on a sunny afternoon when the water temperature is above 13^{o}C to ensure algae are growing and near the water surface. It can be either sprayed on in a concentrated solution or placed in a porous fabric bag and dragged across the water. If spraying on, 1 pint of boiling water will dissolve 1 lb of copper sulphate to make the spray solution. Large water bodies can be treated from a boat.

If flowing water is to be treated, copper sulphate in porous fabric bags can be suspended in the moving water. The size and number of bags required will depend on the water volume to be treated.

For more details on copper treatment :
Copper Treatments for Dugouts http://www.agr.gc.ca/pfra/water/copper_e.htm

Lime (Calcium Hydroxide). Note: The following discussion does not relate to agricultural lime (calcium carbonate).

Lime (calcium hydroxide, slaked lime, hydrated lime or calcium hydrate) is also used to control algae and as for copper sulphate is usually limited to private, non-fish bearing waters. Lime affects fish because it changes the pH of the water and the fine lime particles clog fish gills.

Enhancement Options. Liming a pond or dugout will reduce the nutrients available for algae growth and therefore reduce the need for other algae control methods. While the addition of lime is not a health risk, livestock may object to a change of taste of the water. After 3 or 4 days water near the surface should be clear of lime but it may take up to 10 days for the lime to fully settle out. An alternate water source should be used for this period. If a floating intake is used on a dugout, water may be taken near the surface.

More Information

Farm dugouts (as opposed to "range dugouts or scoop-outs") are a water source that will most often require some sort of water enhancement. Refer to the following for detailed information.

Agriculture and Agri-Food Canada publications

For various water quality information Factsheets:
http://www.agr.gc.ca/pfra/water/quality_e.htm

Some specific Factsheets available at that site are:
For all aspects of farm dugouts:

Quality Farm Dugouts http://www.agr.gc.ca/pfra/water/farmdug_e.htm

For coagulation treatment details:

Dugout Coagulation http://www.agr.gc.ca/pfra/water/dugoutcoag_e.htm

For aeration details:

Why Aerate Your Dugout http://www.agr.gc.ca/pfra/water/yaerate_e.htm

How To Aerate Your Dugout http://www.agr.gc.ca/pfra/water/h2aerate_e.htm

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