Controlled Livestock Watering

Technical Guide

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Using the Technical Guide

This guide is primarily for beef and dairy cattle producers who want to improve the conditions for watering their grazing livestock and protect the banks of watercourses on their farms. The proposed facilities are only appropriate during the grazing season.

This Technical Guide is the result of field trials conducted during the summer of 2001. It is based on the results obtained in the Estrie pilot project. Other types of installations not presented in this Guide are possible.

INTRODUCTION

Controlled Livestock Watering

Controlled livestock watering consists in setting up sites where livestock can drink clean water without having unlimited access to a watercourse. As a result, livestock have access to higher quality water. A number of simple, effective and economical arrangements can be used on the farm to achieve this objective.

Reasons for Controlled Livestock Watering

Controlled livestock watering sites improve the quality of surface water. Erosion and sedimentation are prevented by preserving the buffer strip and reducing bank trampling. The buffer strip acts as a filter and retains certain nutrients from the fields. It also prevents manure from contaminating surface water.

Long-term Advantages for Farm Businesses

Controlled livestock watering also delivers significant sustainable advantages for farm businesses.

- Higher Quality Water for Livestock
  - The water is cleaner, fresher, and more accessible.
  - The animals drink more, improving feed intake, which translates into higher productivity.
- Reduced Incidence of Animal Injury
  - Watering areas are clean and easily accessible.
  - The animals are less likely to injure themselves trying to get to the watercourse.
- Reduced Risk of Disease
  - The water is not contaminated by manure.
  - The animals walk less frequently in mud, reducing the risk of foot rot.
- Reduced Bank Erosion
  - Less sediment accumulates in ditches and less maintenance work is required.

Projet d´amélioration de la qualité de l´eau en milieu agricole pour l´Estrie (Estrie Project for Improving Water Quality in Agricultural Areas)

This pilot project was developed by the Direction régionale de l'Estrie du MAPAQ and carried out jointly with the Fédération de l´UPA-Estrie, the Rivers and Lakes Foundation of Canada, and other partners. The purpose of the project was to develop and promote simple and effective techniques to better control livestock access to watercourses.

The Estrie project addressed three major issues :

- Providing quality water to animals
- Controlling livestock access to watercourses
- Protecting watercourse banks and buffer strips.

The project made it possible to implement different types of installations on a total of 15 farms:

- 40 watering sites on concrete slabs in pastures
- 10 water intakes with 5000 m of water pipe
- 9 animal crossings and 2 access ramps to the watercourse
- 12 000 m of fencing with numerous modifications to stabilize, protect and revegetate banks and the buffer strip.

Did You Know...

- **that a grazing mature cow can drink up to 80 L of water a day?**
- **that certain studies show that animals do not like to travel more than 135 m (400 ft.) for water?**
- **that better quality water tastes better and animals drink more of it?**

Watering Areas

Selecting the Water Source

The water supply may come from a building, a surface well, a spring or a watercourse depending on needs, farm topography and other farm characteristics.

Water Supplied from a Building

This is the simplest method, supplying the watering tank directly from a building (house or barn), ensuring a supply of quality water. The tank must be equipped with a float to prevent water from being wasted.

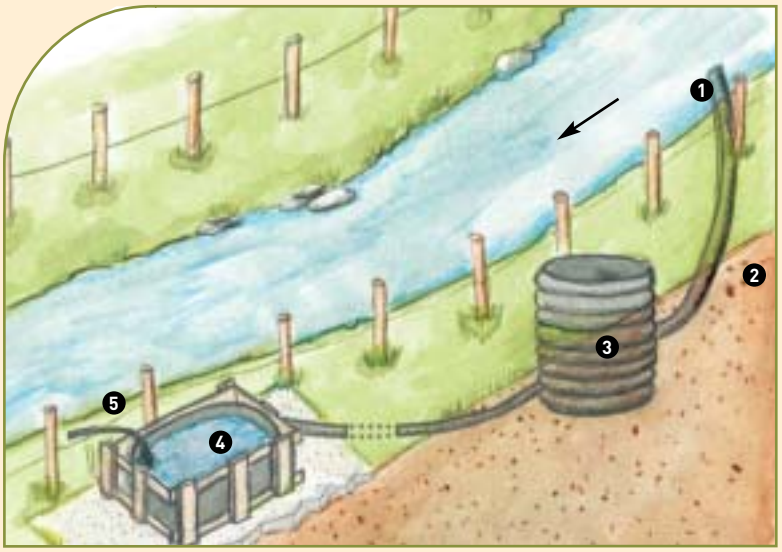
DUAL TANKS SUPPLIED FROM A BARN

Water Supplied from a Surface Well or a Spring

Such systems work by gravity, so the well or spring must be located higher than the watering tank. A surface well is often a better option than a supply taken from a watercourse because well water is generally of higher quality.

SPRING-FED TANK

SURFACE WELL IN A FIELD



Taking water from a watercourse.

1. Intake
2. Drain
3. Storage tank
4. Watering tank
5. Overflow

Water Supplied from a Watercourse

The water is taken directly from a watercourse upstream of the watering tanks. The tank is gravity-fed and flows continuously; overflow is directed back to the watercourse. It should be noted that water from a stream often presents filtering problems and can lead to algae growth in the tank, which increases maintenance.

Recommendations

- **For fields located far from buildings, the water source should be a surface well or a watercourse.**
- **The capacity and flow must be evaluated, taking into account drought conditions.**
- **Depending on the water flow and slope, a number of tanks can be connected in series to the same water source.**

Selecting Water Pipes

Plastic (PVC) pipes are used to carry the water from the source to the watering tanks.

Pipe Strength and Diameter

- Ideally, 100-PSI pipes should be used because they have thicker walls, providing better resistance to pinching and crushing during installation.
- Pipes from a water supply should never be less than 1 inch in diameter so as to facilitate system priming and draining as well as to ensure good flow to the tanks.
- The greater the required flow, the larger the diameter needed. Pipes that are too small provide inadequate flow, making it impossible to add additional tanks later.
- System effectiveness depends on using the proper diameter. No savings can be made by using pipes that are too small.

USE 100-PSI PIPES OF THE RIGHT DIAMETER.

Burying the Pipes

- To increase pipe life and keep the water cool, pipes should be placed at least 30 cm (1 foot) underground.
- Field pipes should be placed at a depth of 45 to 60 cm (1 1/2 to 2 feet).
- Pipes should be protected with pieces of sod when backfilling; take care not to pinch or crush the pipe.

The Proper Slope

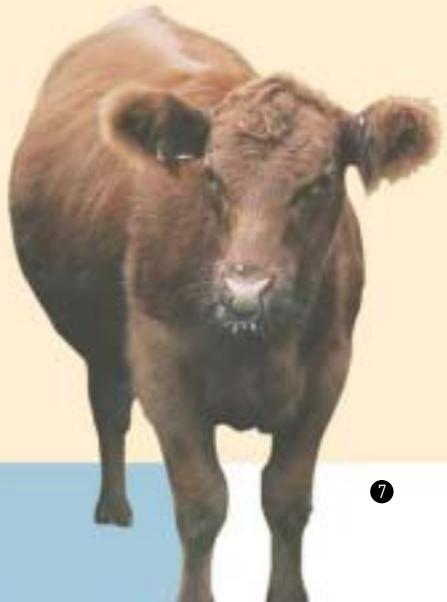
Gravity-fed systems require a minimum slope of 2% (2 feet of drop for every 100 feet of run) for proper circulation.

IT IS VERY IMPORTANT TO CHECK THAT THE WATER FLOWS PROPERLY BEFORE BURYING THE PIPE.

KEEPING A STEADY SLOPE AND STRAIGHT PIPE (NO DIPS) WILL PREVENT AIR LOCKS FROM FORMING.

RECOMMENDATIONS

- **WHEN A NUMBER OF TANKS ARE TO BE CONNECTED IN SERIES, PIPE DIAMETER SHOULD BE CALCULATED SO AS TO LIMIT EXCESSIVE LOAD LOSSES BASED ON FLOW AND PIPE LENGTH.**
- **VALVES ARE NECESSARY TO SHUT OFF THE WATER FOR CLEANING, STORAGE OR REPAIRS. VALVES CAN ALSO BE INSTALLED TO DRAIN THE PIPE BEFORE COLD WEATHER SETS IN.**



Designing the Watering Area

The watering area has three components: the platform, the watering tank, and the facilities around the platform.

The Platform

- The platform keeps the watering area clean and dry by preventing mud and manure from accumulating around the tank.
- The slab should be slanted to let water run off away from any nearby watercourse, to reduce the risk of pollution.
- Depending on the size and arrangement of tanks, the platform can vary from 2.5 m x 3 m (8' x 10') to 4 m x 5 m (14' x 16').
- If the slab is too big, manure can build up, increasing environmental risks and the occurrence of diseases such as foot rot.

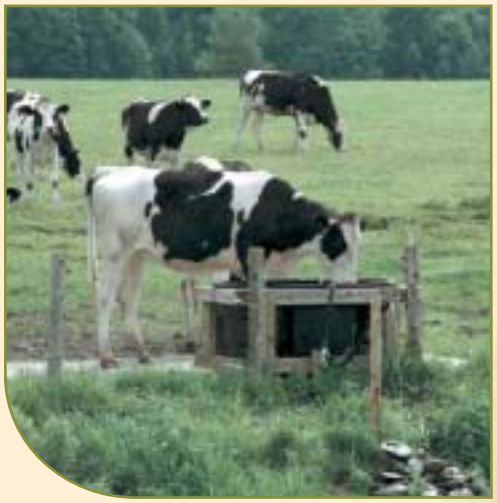
THE PLATFORM IS USUALLY A CONCRETE SLAB AT LEAST 10 CM (4") THICK WITH REINFORCEMENT MESH INSTALLED AT MID – DEPTH.

Selecting the Watering Tank

- The minimum capacity for the watering tank is 450 L (100 gallons).
- Old bathtubs are not recommended since they aren't big enough. Moreover, they are harder to maintain and make it difficult to control the water level.
- Plastic tanks are generally easier to empty, lighter, and less expensive than steel tanks of the same size. Some plastic tanks have a compartment that protects the float valve, which is not the case with steel tanks. Plastic tanks may also have outlets for connecting them in series.

TANKS USUALLY HAVE A WOODEN STRUCTURE FOR PROTECTION AND ARE ANCHORED TO THE SLAB.

- The water level in the tank can be controlled by an overflow (continuous circulation) or a float valve, several types of which are available.



450 L (100 GALLON) TANK WITH THE OVERFLOW DISCHARGING INTO THE STREAM.

Facilities Around the Platform

- Fencing can be installed along the sides of the platform to limit access and prevent the animals from jostling each other. This arrangement reduces the amount of time spent by animals on the slab, which helps keep it cleaner.
- Good drainage is needed around the concrete slab.

A WOODEN FENCE ALONG THE SIDES MAY BE PREFERABLE IF THE ANIMALS ARE OVERLY STRESSED BY ELECTRIC FENCING.

WHEN POSSIBLE, THE WATERING AREA SHOULD BE SHADED TO KEEP THE WATER COOL.

Recommendations

- It is preferable to install two small 450 L (100 gallon) tanks on a concrete slab rather than a single large one to more easily accommodate changing needs.
- The slab and tank should be cleaned at least every 2 weeks. Drain valves, minimum of 2.5 cm (1") in diameter, can facilitate tank maintenance.
- It is important to check the operation of the watering system at least once a week.
- Quick-coupling valves can make installation easier if the same tank is used at several locations on the farm

Controlling Livestock Access to the Watercourse

Installing Fencing along Watercourses

- Installing fences along watercourses is essential to controlling livestock watering. Restricting access to stream banks compels the animals to water at the areas provided. This protects the buffer strip as well as the quality of surface water.
- A good-quality standard electric fence is both adequate and inexpensive.
- Fencing should be installed so as to preserve a buffer strip no less than 1 m in width from the crest of the slope in accordance with current regulations.
- Fencing is installed only along banks that livestock have access to.

Designing a Crossing

- A crossing allows stock to cross a watercourse without having free access to it.
- This type of arrangement is an economical alternative to bridges and culverts, which are generally expensive.
- Crossings can also be used for farm machinery.
- Livestock should only have access to the watercourse when crossing. This means that the sides must be fenced.
- The ideal slope for a crossing is 1 : 10 (1' of drop for every 10' of run). A slope of up to 1 : 6 can be used in certain cases.

CROSSINGS: LIVESTOCK HAVE ACCESS TO THE WATER ONLY WHEN CROSSING. THE SIDES OF THE CROSSING ARE FENCED.

RECOMMENDATIONS

- **RESTRICTING LIVESTOCK ACCESS TO WATERCOURSES REDUCES COSTS RELATED TO WATERCOURSE DREDGING AND MAINTENANCE.**
- **A MOVEABLE FENCE WITH STEEL STAKES CAN BE USED IF THE WATERCOURSE IS SUBJECT TO SPRING FLOODING.**

Protecting Banks and Designing a Buffer Strip

Buffer Strip Usefulness

The buffer strip is the land lying along a watercourse. According to current regulations, the buffer strip must be at least 3 m in width starting at the high water mark and extend at least 1 m beyond the crest of the slope.

A well-designed buffer strip helps maintain bank stability and acts as a filter for phosphorus, nitrogen, and pesticides carried by field soil erosion. In addition to its significant environmental advantages, the buffer strip reduces the loss of cropland due to erosion.

The minimum requirement for an effective a buffer strip is a permanent vegetation cover. Planting trees and shrubs helps further stabilize banks while providing shade that enhances the quality of aquatic habitats.

Selecting Plants

It is not always necessary to seed or plant vegetation. Natural regrowth in the protected area is often enough to restore most areas subject to livestock trampling. In cases of severely deteriorated banks, however, it may be necessary to revegetate the buffer strip.

In such instances, it is important to select species of shrubs that live naturally in the region and grow along watercourses. Native species are usually well-adapted to the climate, have greater resistance to disease and insect infestation, and require little care.

Sweet Gale

Seeding with a mixture of grasses is often enough to provide permanent cover. Some seed companies may carry seed blends designed to keep maintenance to a minimum.

Spirea

Willow Shrub

Recommendations

- **Banks should be evaluated to determine whether they can be restored naturally or if they should be stabilized, depending on the level of deterioration. Certain cases may require the placement of stones.**
- **Expert advice is recommended before attempting to modify the buffer strip, particularly if it involves placing stones and revegetating banks.**

Proper planning results in less time lost and prevents unnecessary expenditures. It is important to have suitable information from a technical advisor (MAPAQ).

Farm Layout

The following points can guide farmers in gathering information before meeting with an advisor.

- The condition of the banks where livestock currently water.
- The quality of the water currently used (cleanliness, freshness).
- The distance livestock must travel to reach water.
- Whether a surface well can be used, depending on slope and capacity.
- The herd's water needs. As a rule of thumb, a herd of 50 cows can require up to 4000 L of water (nearly 1000 gallons) per day.

Planning the Installations

- At this point, it is very important for the livestock producer to meet an advisor who can provide information and technical support.
- An aerial photo of the farm, a farm layout, and a pasture layout are very useful for planning.
- When visiting the site, the producer and advisor should:
  - Determine the needs (watering tanks, livestock crossing, and others) and locate the facilities accordingly.
  - Determine the capacity (flow) of the water source.
  - Measure the length of water pipes and fences.
  - If necessary, assess the work needed to protect the banks.
- Then, they will be able to:
  - Prepare a working plan.
  - Draw up a list of work to be carried out and the materials required.
  - Estimate the cost of the work.
  - Prepare a work schedule.
  - Revise the pasture layout based on watering areas.

Estimating Costs

- Costs can vary greatly depending on the farm and the type of equipment selected by the livestock producer. Based on the Estrie Project, costs for a complete installation ranged from $5000 to $8000.
- The producer should closely review the estimated costs with the advisor.
- The table below provides the average costs for certain installations (the figures come from the *Projet d´amélioration de la qualité de l´eau en milieu agricole*, conducted in Estrie in summer 2001).

AVERAGE COSTS

Projet d´amélioration de la qualité de l´eau en milieu agricole (2001)

TYPE OF INSTALLATION	COST
Watering Area Includes: 10' x 12' concrete slab wire mesh 100 gallon tank wooden frame float, valves, plumbing	**$600**
Additional tank	**$150**
Water pipe (100-PSI) 1 ½" diameter 1" diameter	 **$0.80 per foot** **$0.40 per foot**
Backhoe to backfill the pipe trench	**$0.30 per foot**
Livestock crossing	**$500**
Electric fence Includes: posts, wire, insulators	**$0.15 per foot**

Permits and Authorizations

- Before starting work in a watercourse or along its banks, you need to obtain information and obtain all the required authorizations.
- Certain types of work require a municipal permit or a certificate from the Ministère de l´Environnement du Québec. **Failure to obtain the proper authorizations before carrying out the work can result in very severe penalties**.
- For more information, contact your regional UPA office or the regional office of the Ministère de l´Environnement du Québec.

Additional Resources

Where to Find Additional Information

- Your MAPAQ regional office
- Your regional UPA federation
- Your agri-environmental club
- Field demonstrations and farm visits.

Publications

- Projet d'amélioration de la qualité de l'eau en milieu agricole. 2002. Document vidéo, ***L'abreuvement contrôlé du bétail hors cours d'eau : une solution économique et écologique***
- Fédération de l'UPA-Estrie. 2001. *Les travaux dans les cours d'eau en milieu agricole*
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- Centre de référence en agriculture et agroalimentaire du Québec. 1997. Guide bovins laitiers, feuillet technique AQ037, *Abreuvement au pâturage*
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Notes

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