ALTERNATIVES TO DIRECT ACCESS LIVESTOCK WATERING

April 2000

DIRECT ACCESS WATERING

Clean water is a key factor in a healthy beef production system. There is a direct relationship between water intake and feed intake. Animals that drink more are likely to graze more, which of course improves weight gain.

This **Water Quality Matters** publication provides information on the impacts of direct watering of livestock on water quality and some of the management alternatives that exist for improving water quality by restricting animal access to water bodies.

PROBLEMS ASSOCIATED WITH DIRECT WATERING

Livestock are often watered by allowing them direct access to streams, lakes, reservoirs or dugouts. This is particularly true for range cattle, but many cattle wintering sites also permit full access to dugouts and other fresh water bodies. Direct access raises a number of questions and concerns about negative impacts on water quality. Poor water quality can be a concern both in terms of downstream water users, as well as animal health, safety and productivity.

Cattle defaecate in and around water if they are allowed direct access to a water source. Plant nutrients in animal excrement contribute to excess algae and plant growth. Excrement also introduces disease-causing organisms such as bacteria, viruses and parasites, to water sources.

BEST MANAGEMENT PRACTICES

Sustainable agriculture requires that soil and water quality be maintained. Some farm practices have the potential to cause environmental harm, which may affect rural and urban areas alike. Many of the potential negative impacts of farming can be greatly reduced by the use of *Best Management Practices*. These are agricultural practices that reflect current knowledge about conserving soil and water without sacrificing productivity.

Water is continually cycling. The water that we use has been used before. Producers and consumers, rural and urban people and the public and private sectors, are all responsible for using water wisely and ensuring that the resource is maintained for others. *Best Management Practices* are one way for the agricultural sector to help preserve water quality.

Allowing livestock direct access creates many problems with water quality

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Agriculture et Agroalimentaire Canada
Prairie Farm Rehabilitation Administration
Administration du rétablissement agricole des Prairies
Canada

Over-grazing and trampling of streambanks by cattle can increase runoff of sediment into water bodies. In the case of a dugout, destruction of side-slopes by hoof action will significantly shorten its useful life. With lakes and streams, increased sediment loads may limit downstream suitability for agricultural, recreational, industrial and domestic uses. Sediment may also reduce the ability of a lake, stream or reservoir to support fish and other aquatic species.

Direct access watering can also lead to herd health problems. Cattle lingering in water tend to develop foot-rot. Excrement in the water may expose animals to pathogens, which can have significant impacts on health and weight gain. Some algae species, particularly certain blue-green species, produce toxins which can be fatal to livestock when ingested. Algal blooms tend to concentrate near the edges of dugouts due to wind action. With direct access, cattle tend to drink near the edges of dugouts, risking exposure to high concentrations of algae. There is also increasing scientific information suggesting that cattle may drink less water when it is poor in quality, possibly leading to reduced feed conversion and productivity.

LIMITED ACCESS OR TOTAL EXCLUSION?

A number of strategies will minimize streambank damage without completely excluding the animals. Low flow crossings and hard surface ramps give animals the opportunity to cross streams and drink without entering deep water or disturbing sediment.

Pasture management programs can be designed to allow time for recovery of riparian areas or to prevent animal access to the riparian zone in spring and early summer when streambanks are most susceptible to damage.

There is mounting evidence that animals will choose to drink from troughs rather than streams, when given the choice. This indicates that remote watering devices may have significant impacts on water quality, even where the stream is not protected by fencing.

In many cases, the preferred way to protect water quality is the total separation of the animals and the water source with fencing. When this is the chosen alternative, a remote watering system is necessary.

THE ESSENTIALS OF A REMOTE WATERING SYSTEM

The requirements of a remote watering system include a power source, a pump and a storage reservoir. All systems have strengths and weaknesses. Factors affecting the choice of a system are reliability, cost, herd size, remoteness of location, individual site characteristics and personal preferences.

When designing a system, a number of factors must be considered:

- optimum pumping rate (total daily volume requirement per minutes of pump time per day)
- distance between pump and source
- distance between pump and outlets
- height difference between outlets and source

With this information, equipment suppliers will be able to provide guidance for equipment selection and sizing.

SYSTEM ALTERNATIVES

Fossil Fuel

Portable combustion engines can be used to move water from the source to a watering area. A large storage reservoir is filled, from which gravity-fed watering troughs are kept full with a float control device. The site must be visited routinely to replenish the reservoir. For reasons of economy of time, large generators and large pumps are preferred.

Solar

Photovoltaic panels produce DC electricity from sunlight using silicon cells. Solar panels are durable, have no moving parts, operate well in a wide range of temperatures, and have life expectancies exceeding 15 years. Solar trackers may be added to a system to increase energy capture by following the path of the sun.

Solar pumps are most efficient when using DC power directly from the panels. Unless high volumes are required, solar pumps are positive displacement devices that can operate during low light conditions without stalling or overheating. Pumps may be floating, surface, or fully submersible.

Storage of power with batteries or water with a storage tank is necessary to maintain these systems through long

Excess power produced by solar panels can be used to aerate a dugout or power an electric fence

stretches of overcast conditions. Solar watering systems can be portable or water can be moved as far as several kilometres using a piping system.

Stream Flow

Where there are strong and constant currents in a stream, the energy can be used to power a pumping device. These conditions are not often met in the Canadian Prairies. Examples of systems and devices that rely on hydraulic energy are sling-pumps, gravity flow systems and hydraulic ram pumps.

Wind systems should be designed with more storage than solar systems

Wind

Windmills are an age-old technique for pumping water. The energy in the wind drives a propeller. The rotary motion of the propeller is used to drive a pump that moves water to a storage reservoir. Floating devices, such as sling-pumps can also be powered by wind.

As with solar systems, wind systems must have sufficient storage capacity to maintain a constant water supply through an extended period without wind. Either water or electricity can be stored. Trees, shelterbelts and other barriers (fences, buildings) may significantly decrease the energy available to a wind-powered system.

Animal-powered

Animals can rapidly learn to use devices that enable them to pump water themselves.

The most common device is the nose pump. The animal moves a lever with its nose to reach a watering bowl. This motion operates a diaphragm pump which pumps more water into the bowl. Nose pumps are highly portable and no storage reservoir is required. A period of time is required for animals to learn how to use the pump.

One nose pump can provide enough water for 30 cow/calf pairs

Pipelines

Many intensive grazing operations install pipeline systems to distribute water to several pastures, rather than constructing many small dugouts. Pipelines allow the producer to place watering systems where they are most needed.

Shallow buried pipelines are the most common, but some producers bury pipelines deeper to allow for year-round use. Shallow buried pipelines are commonly trenched in about a foot deep.

Depending on topography, pipelines can operate through a gravity-flow system or via a pressurized system. The design of the system must be considered to ensure that the diameter of the pipe and the length of the pipeline will meet watering needs.

Pipeline systems are well-suited to paddocks where several sites can be watered with one system

Hauling

In some cases, the most economical method of remote watering may be truck hauling. A storage tank is required in the pasture as well as on the truck. This can be extremely time-consuming compared to automatic pumping.

REMOTE WATERING IN A PRAIRIE WINTER

In winter climates, livestock are usually pastured close to home. However, new practices such as fall grazing and efforts to prevent direct access to water sources in winter feeding areas, require that remote watering systems be prevented from freezing. In winter, it is especially important to keep animals out of dugouts. There is a high risk of cattle breaking through ice and drowning, which incurs a huge economic loss for the producer.

Ways to prevent ice formation in remote watering systems include insulation, heating devices, wet wells with constant circulation mechanisms or direct drain-backs and underground burial of water lines. Most remote watering systems can be adapted to prevent freezing.

THE BIG PICTURE

There are many good reasons to consider remote watering of livestock. Algal blooms and faeces in dugouts may cause problems with animal health and productivity. Strong currents, mud or thin ice in winter may jeopardize animal safety. Nutrient, sediment and bacterial loading of lakes, rivers, reservoirs and streams can cause problems for both agricultural and non-agricultural downstream users.

A number of systems for remote watering of livestock are available because no single system will suit all producers. The best system will depend on the particular requirements of each operation. Sometimes, the best fit will be a combination of different components.

"The Stockman's Guide to Range Livestock Watering from Surface Water Sources" can provide more information on remote watering systems.

For more information about *Best Management Practices* see the following **Water Quality Matters** publications: "Protecting Your Water", "Agricultural Best Management Practices", "Soil Texture and Water Quality", "Riparian Area Management", "Nutrient Management Planning" and "Pest Management and Water Quality".

For further information on rural Prairie water quality issues:

- read the other publications in PFRA's **Water Quality Matters** series;
- visit the PFRA Website at www.agr.ca/pfra;
- read Prairie Water News available from PFRA, or on the Internet at www.quantumlynx.com/water; or
- **contact your local Prairie Farm Rehabilitation Administration Office** (PFRA is a branch of Agriculture and Agri-Food Canada).

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FUNDING: Strategic support and funding for this project has been provided by the Canada-Saskatchewan Agri-Food Innovation Fund (AFIF) and the National Soil and Water Conservation Program (NSWCP). Funding for the NSWCP is provided by Agriculture and Agri-Food Canada.