environmental farm plan
sustainably farmed

INFOSHEET #10

LIVESTOCK FEEDING AND SILAGE MANAGEMENT

How to address concerns identified in Environmental Farm Plan Worksheet #10

Based on Environmental Farm Plan Workbook, 5th ed. 2025

This infosheet outlines options to address concerns identified in your Environmental Farm Plan (EFP) as they relate to livestock feeding and silage management.

For help with technical terms, please see the full glossary in your EFP Workbook.

All options in this infosheet are classed as **Actions, Compensating Factors,** or **Monitoring**.

- **Actions** address the identified concern, and will change the EFP rating to (3) or (4) Best.
- **Compensating Factors** are alternatives that will adequately address the concern, but will not change the rating in the EFP worksheet.
- **Monitoring** is an alternative in special circumstances only. When and how monitoring can be used is explained in the infosheet.

In most cases, you'll need more information before choosing and implementing options. Sources for more information are noted at the end of this infosheet.

Sustainable Canadian Agricultural Partnership
OSCIA
Ontario
Canada

10-1. Distance from silage storage to nearest surface water

BACKGROUND

Increasing the distance between the silage storage and surface water lowers the risk of contaminating surface water supplies.

Sloping topography and heavier soil, such as clay, will increase the chance of contaminated runoff reaching surface water.

Leachate from silage storage is one of the most dangerous substances that can be discharged from a farm. The high biochemical oxygen demand of the leachate is deadly to fish if it runs off to surface water.

Maximize distance between the silage storage and surface water to minimize risk to surface water quality.

For an overview of how water cycles across and below a farm operation, on-site risks to water quality, and practical ways to protect it, see this BMP publication – Water Management.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Relocate the silage storage further than 60 m (200 ft.) from surface water.

OPTION 2 – COMPENSATING FACTOR

Increase the flow path distance between surface water and the silage storage:

- reshape land or build a diversion to direct runoff away from the surface water to a location in the field or along a flow path where it will not reach the surface water
- ensure any land-forming changes will not cause or increase erosion on either your property or neighbouring lands
- seek professional assistance to site and design berms, particularly along larger watercourses
- contact your local Conservation Authority for more information and to see whether permit(s) are required – permits are often required for work adjacent to surface water
- note that the flow path length must meet or exceed the minimum EFP distance specified in the (3) category

OPTION 3 – MONITORING

For silage storages in good working condition that have, or will have within two years, a seepage collection system.

Monitor on an established schedule:

- visually check for leaks or overtopping of the seepage storage

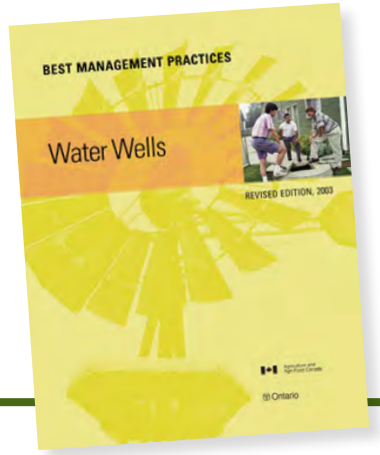
10–2. Distance from silage storage to water well

BACKGROUND

Increasing the distance between the silage storage and the water well, reduces the risk of seepage collecting in the vicinity of the well head and causing contamination.

Soil type, depth to water table and bedrock also influence contamination potential.

Test the well water once a year for parameters such as nitrate until the new storage is built or the existing storage is relocated.



Learn more about your water well and how to identify and mitigate risks to your family's water supply with this BMP publication.

Water Wells explains how wells function, their components, different types, siting and risk issues, maintenance, new well construction requirements, and procedures for unused wells.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Relocate the silage storage the required distance from the water well:

- locate the storage downslope of the well if possible
- ensure the new storage location will change the final EFP distance rating to a (3) or (4) Best

Test the well water 3 times a year for bacteria and once a year for nitrate.

OPTION 2 – ACTION

Drill a new well the required distance from the silage storage:

- properly abandon the old well according to Regulation 903 of the Ontario Water Resources Act
- ensure the new water well location will change the final EFP distance rating to a (3) or (4) Best

OPTION 3 – MONITORING WELL WATER

For silage storages in good working condition that have, or will have within two years, a seepage collection system.

Test the well water 3 times a year for bacteria and once a year for nitrate:

- be prepared in case test results reveal contamination and prepare an action plan to immediately identify and address source of contamination

Monitoring of impacted well water is **NOT A SATISFACTORY SOLUTION**.

SILAGE STORAGE STRUCTURES (TOWER OR HORIZONTAL)

10–3. Floors, walls and foundations

BACKGROUND

Silo floors, walls and foundations can be pathways for seepage.

Unsealed floors and cracks in the walls and foundations allow seepage movement to groundwater below or to surface water near the silo.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Install impervious floors and ensure that walls and foundations are structurally adequate with cracks sealed:

- explore the feasibility of a plastic barrier in the floor of vertical silos to prevent seepage from reaching groundwater below
- consider installing a silo drainage system that allows any free liquid to drain to a collection system

OPTION 2 – ACTION

Seal the existing silo floor by caulking joints, cracks, etc. Consult a qualified professional (engineer and contractor) to ensure that walls and foundations are structurally adequate with cracks sealed:

- a brushed-on epoxy coating may be adequate if only hairline cracks exist
- consider installing a silo drainage system that allows any free liquid to drain to a collection system

WARNING: Lethal concentrations of hazardous gases can be found in confined spaces such as tower silos. Never assume that the environment inside a silo is safe.

Refer to OMAFA factsheet:
Hazardous gases on agricultural operations

Proper materials and maintenance of the silo's floor, walls and foundation can minimize seepage movement. Structurally sound walls and foundations are also important for operator safety.

Read OMAFA factsheet:

Deterioration of concrete tower silos

10–4. Cover

BACKGROUND

Keeping rainwater out of silage is an important preventive measure. Rainwater negatively affects the ensiling process and ultimately silage quality.

A silo roof or cover reduces dry matter and nutrient losses, surface freezing, spoilage, and potential leachate production.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Install a permanent roof or a cover on the silo to exclude rain and snow:

- ensure that the roof or a cover is tight-fitting without leaks

OPTION 2 – ACTION

Repair the existing silo roof or cover to eliminate leaks.

A roof or cover reduces nutrient losses from seepage.

10–5. Lining (tower)

BACKGROUND

Liquids generated from silage are acidic and will corrode silo walls. A badly corroded wall increases the risk of silage effluent escaping the silo.

Silo walls should be relined regularly. This helps seal in the leachate and maintain the silo's structural integrity.

Read OMAFA factsheets:

Deterioration of concrete tower silos

Managing silage effluent

Relining silo walls helps to seal in seepage and maintain structural integrity.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Reline the silo walls as required, but at least once every 15 years:

- use a plaster mix of fine sand and cement or liquid coatings to reline silo walls – the selection will depend upon the condition of the wall interior after it is cleaned
- seek advice from a qualified professional (engineer, contractor) as needed

OPTION 2 – ACTION

Replace the existing silo with a new silo:

- protect the new interior silo wall by applying an acid-resistant coating such as epoxy prior to its initial use
- ensure the new silo location meets the EFP distance rating of (3) or (4) Best

OPTION 3 – ACTION

Have the silo lining condition checked by a qualified professional (engineer, contractor) at regular intervals, e.g., every five years.

WARNING: Lethal concentrations of hazardous gases can be found in confined spaces such as tower silos. Never assume that the environment inside a silo is safe.

See the OMAFA factsheet:
Hazardous gases on agricultural operations, Order no. 22-059

10-6. Silage effluent management

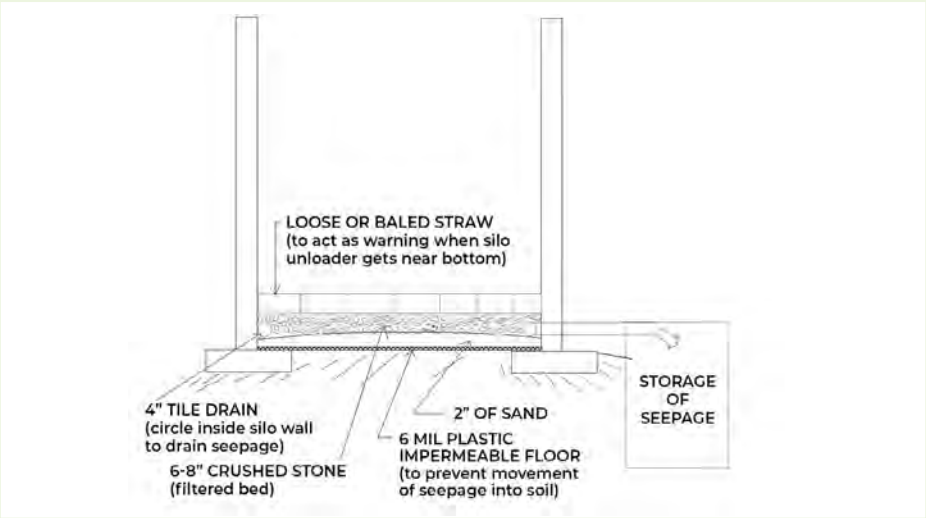
BACKGROUND

Large amounts of silage effluent can be produced, especially if the silage is harvested and stored at higher-than-recommended moisture contents.

Leachate from silos can be the most dangerous polluting organic surface discharge that occurs on the farm. Its high biochemical oxygen demand is deadly to fish if it runs off to surface water.

A system should be in place to handle seepage from tower and horizontal silos and from baleage if the moisture content is 75% or greater.

Caution: Never mix silage effluent in enclosed manure storage tanks, especially tanks within barns, because silage effluent mixed with manure slurry will accelerate the release of deadly hydrogen sulphide gas. Add effluent only to uncovered outdoor storages.



A leachate collection system can be low tech, low cost and highly effective.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Install a leachate collection system at the silage storage location to intercept seepage.

Transfer leachate by a gravity or dedicated pump to an open-top liquid manure or runoff storage – never to an under-barn storage:

- divert all surface water and rainfall away from the silage storage so it does not have to be collected and stored
- collect and store all silage liquid and spread effluent on cropland – bearing in mind the acid content and the concentration
- install a drainage system in the silo floor to intercept seepage and transfer it to uncovered liquid storage

OPTION 2 – ACTION

For low flow rates of effluent:

- install a designed collection and storage system for this concentrated material

For high flow rates (diluted):

- construct a vegetated filter strip of the required size to intercept and absorb the seepage
- hire a professional engineer to design the strip
- seek approval for installation from the appropriate agency

Read these OMAFA publications:

Vegetated Filter Strip System Design Manual, Publication 826

Managing silage effluent

FEEDING STRATEGIES TO REDUCE GHG

10-7. Livestock nutrition

BACKGROUND

Feed conversion efficiency can be improved by including changes to how animals are fed, what they are fed, and the digestibility, energy and nutrients available in the feed.

Feed conversion efficiency is the amount of feed consumed per kilogram (pound) of product produced (e.g., live weight, milk or meat). Improving feed conversion efficiency can decrease enteric methane emissions.

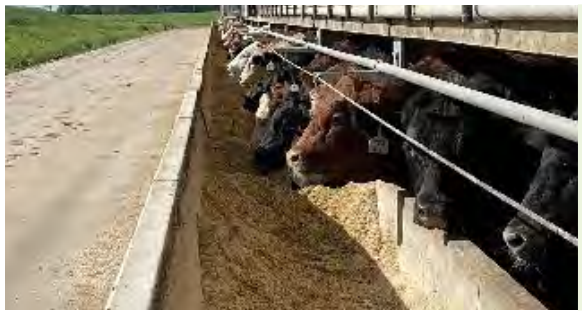
Enteric methane emissions from ruminant animals increases with higher feed intake and in diets with poor digestibility.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Adjust your operation to include as many of these best practices as possible:

- grouping by age, weight, production level and gender to match similar nutritional requirements and stages of production
- regular reconciliation of feed inventory and productivity per unit fed
- quarterly feed testing and diet formulation
- selecting, harvesting, storing and feeding higher digestible forages with less spoilage
- monitoring feed intake and feed conversion
- limiting feeding/slick bunk management to improve feed conversions and reduce feed waste



Enteric methane emissions can be reduced by improving feed conversion efficiency.

10-8. Technology to reduce enteric methane

BACKGROUND

In addition to feed additives already commonplace in ruminant diets (e.g., ionophores) that have been used to reduce enteric methane emissions, new and advanced products continue to enter the marketplace and will provide improvements to enteric methane reduction.

Livestock geneticists have demonstrated the amount of methane produced per unit production (kg of milk or live weight) is partially related to genetics. This means that methane emissions can be reduced through genetic selection.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Work with your nutritionist to adjust livestock diets and include methane reducing additives as they become commercially available. This is practical in confinement feeding operations like dairies or feedlots where total mixed rations (TMR) are used. However in cases where animals are grazing, daily inclusion of these products is difficult.

OPTION 2 - ACTION

Work with your genetics advisor and provider (e.g., semen distributor, ram/bull breeder) to select sire lines with demonstrated methane reductions, while maintaining other important traits such as gain, feed efficiency, production per unit feed, and other product quality and welfare traits (e.g., polled, temperament, parasite resistance).

FOR MORE INFORMATION

ONTARIO MINISTRY OF AGRICULTURE, FOOD AND AGRIBUSINESS (OMAFA)

- Agricultural Information Contact Centre (AICC)
  Toll free: 1-877-424-1300 | e-mail: ag.info.omafa@ontario.ca

  Find most of the resources listed below at www.ontario.ca

Publications

- Vegetated Filter Strip System Design Manual, Publication 826
- Guide to Forage Production, Publication 30

Factsheets

- Deterioration of concrete tower silos
- Managing silage effluent
- Hazardous gases on agricultural operations
- Farm buildings, equipment and environment
- Protecting the quality of groundwater
- Water management in agriculture

Best Management Practices Series

- Water Management
- Water Wells

LEGISLATION/ACTS

- Ontario Water Resources Act, 1990
- Environmental Protection Act, 1990
- Fisheries Act, 1985