

Fact Sheet #9

**Reducing the Risk of Groundwater Contamination by
 Improving Silage Storage**

1. Silage moisture content

Silage can be made from corn; silage crops, such as grain or alfalfa; and canning company wastes, such as from sweet corn processing. The amount of leachate (silage juices) produced varies with the material stored, its moisture and nitrogen content, and handling and storage conditions. Of these, moisture is the most crucial.

Research indicates that materials stored at 65 percent moisture content or higher can produce leachate. For grass silage, the amount produced varies from a trickle at 75 percent moisture to 79 gallons per ton at 85 percent moisture. About three-quarters of the leachate is produced in the first three weeks of storage, although it can continue to flow for up to three months.

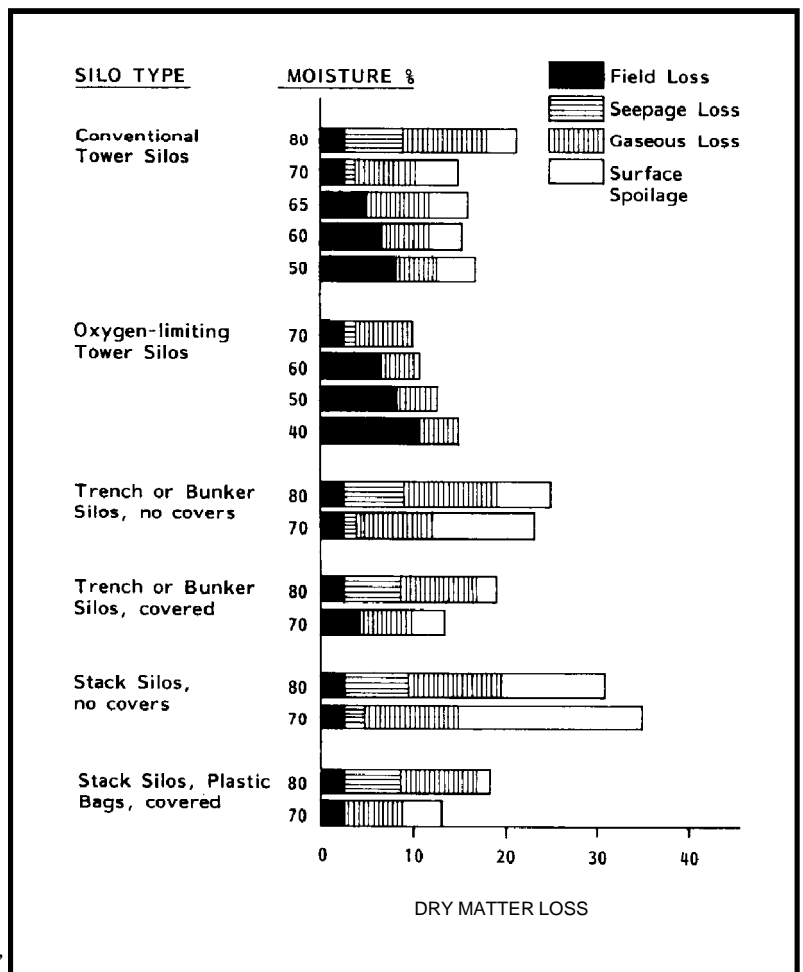


Figure 1: Chart of silage moisture content.
 Source: *Beef Housing and Equipment Handbook, MWPS-6, Fourth Edition, 1987, Midwest Plan Service, Ames, Iowa.*

Farmers can use several methods to reduce leachate production from silage, such as varying cutting and harvesting times, cutting or crimping the materials, or adding moisture-absorbent materials to the silage as it is stored.

Adding absorbent materials not only reduces leachate, but it also raises the nutrient value of the silage. Materials to use include oat meal, dried sugar beet pulp, dried corn cobs, ground corn, newsprint and bentonite clay. Most of these materials will absorb from one to three times their weight in water, and, to be effective, enough must be added to absorb the anticipated leachate.

2. Silage storage

Most harvested silage is characterized as low-moisture silage. The crop is allowed to wilt to the proper moisture content before chopping to ensure proper ensiling. Silage put into horizontal silos is typically at a higher moisture content. Haylage stored in tower silos has been reported to produce significant amounts of silage juice. However, no cases of water pollution in New Mexico have been documented from those facilities. Although many older silos may have dirt floors or may have been dug into the subsoil 3–6 feet below ground level, new silos are built with concrete foundations and floors. Horizontal, pit or trench silos on bare ground can threaten groundwater.

Although not specifically regulated, silage storage is subject to regulations governing leachate and ground and surface water contamination. Water Quality Control Commission (WQCC) Regulation part 3 controls discharges onto or below ground in order to protect groundwater quality. Groundwater discharge permits, issued under this regulation, are reviewed every five years.

WQCC Regulation 1-203 governs the reporting and cleanup of unanticipated discharges from storage facilities, and requires corrective measures to prevent subsequent spills. Design and construction information is available from your county Extension agent. Check with the Environment Department, Groundwater Protection and Remediation Bureau before constructing silage storage facilities.

3. Silo location

To prevent possible well contamination, silos should be located as far away from wells as practical. Minimum separation distances regulate new well installations. Existing wells are required by law only to meet separation requirements in effect at the time of well construction. Make every effort, however, to exceed “old requirements,” and strive to meet current regulations whenever possible. See Farm•A•Syst Fact Sheet #1 (Improving Drinking Water Well Condition) for current separation requirements.

4. Silo design and construction

Silo construction is not regulated in New Mexico, though a groundwater discharge permit may be required for proper control of leachate.

Most silos being built today have interiors made of concrete or, in the case of oxygen-limiting silos, a glass-like coating over steel. Silage stored in glass-lined silos typically has a lower moisture content and poses a low risk of groundwater contamination. It is possible, though, for some liquid to leak out.

Silo bags generally store silage of higher moisture content. Liquid can pool in the bag and leak out when it is opened.

Horizontal trench silos excavated into the ground may affect groundwater, especially in coarse soils and sites close to the water table. Properly compacted clay soils and concrete floors can limit leachate seepage.

The type of silo on your farm often has less effect on its potential to contaminate groundwater than the condition of the silo. For example, an old wooden silo with an earthen floor poses a higher risk than a concrete horizontal silo with a concrete floor (see Figure 2). Older structures can be relined to make them relatively watertight.

Silo caps or covers keep rain water from entering the silage, preserving a quality silage, but also reducing the potential for producing leachate. Horizontal silos are covered with a plastic sheet. Tires are used to keep the cover in place.

It is important to divert clean water away from new and existing silage storage structures. For both vertical and horizontal silos, diverting clean water away from silage can protect both groundwater and surface water.

5. Leachate collection and disposal

Leachate can be collected from tower and horizontal silos by channeling the liquid into a water retention structure, usually a pond lined with concrete, clay or plastic. Drain tiles around tower silos can be used to collect any seepage from the silo. Horizontal silos use channels to direct seepage into a collection area. Contact your county Extension office for assistance with design.

The most cost-effective disposal method is land spreading. Nitrogen in leachate has significant fertilizer value. In New Mexico, leachate may be applied to crops, but total nitrogen applied cannot exceed expected crop uptake by more than 25%, or 200 pounds per acre per year, whichever is greater. Certain other requirements must be met.

Because of its high organic content, leachate can burn grasses and remove oxygen from the soil. Farmers who consider land spreading should consult a soil specialist to determine how much leachate can be safely spread on each field.

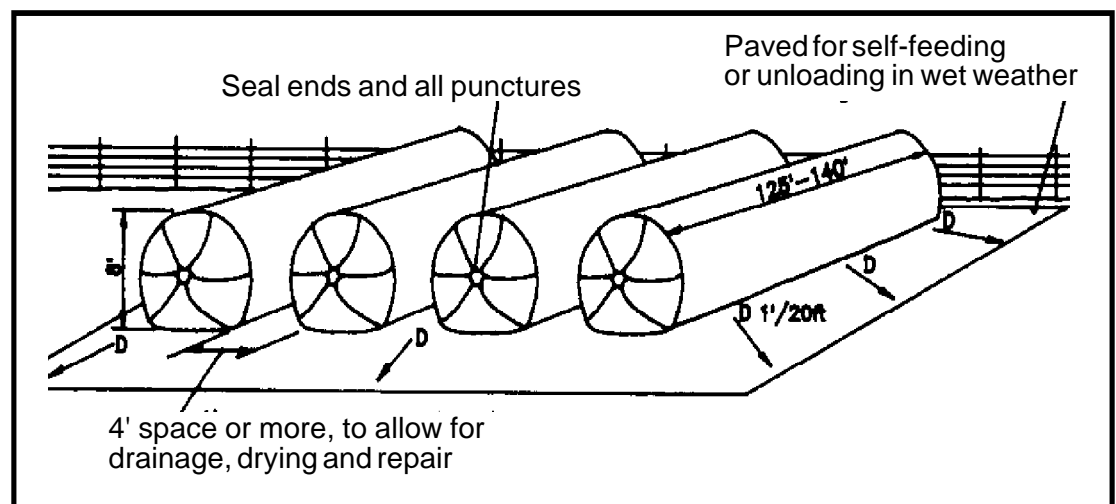


Figure 2: Horizontal silo. Source: *Beef Housing and Equipment Handbook, MWPS-6, Fourth Edition, 1987, Midwest Plan Service, Ames, Iowa.*