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AUG 31 1963
SCI., TECH. & AGR. DIV.

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AGRICULTURAL ENGINEERS' DIGEST

LAGOON MANURE DISPOSAL

E.C. 63-724

One successful method of swine & poultry manure disposal is through the biological decomposition that takes place in a shallow pond, called a lagoon.

In some livestock production units, manure decomposition is more economical than field spreading.

LOCATION

Place the lagoon as far as practical from the farm home - 300' minimum. Locate where summer breezes, usually from the SE or SW, will carry odor away from the house.

Locate the lagoon adjacent to or near the source of waste.

If the lagoon is downhill from the farmstead, gravity will carry waste to it.

Prevent water supply contamination by avoiding very sandy soil, and shallow soil (less than 20') over limestone. In mixed sand, silt, and clay soils, place the lagoon at least 100' away from well.

Soil types - impervious soils are recommended. Open soils in the floor of the lagoon will be sealed with sludge in 30 days with daily loading.

LOADING

The first loading should be gradual in the summer months. Surface water may be added to the lagoon to provide sufficient water. If the lagoon is started in the winter, loading rate is not important because decomposition probably will be slight before warmer weather.

After the lagoon is full, surface water should be diverted away. Although daily loading results in best lagoon operation, management of the livestock facility may require intermittent loadings. Bedding must be avoided because it will accumulate in the lagoon, will retard decomposition of the wastes, and require more frequent cleaning of the lagoon.

AEROBIC VS. ANAEROBIC

Two types of bacteria decompose the wastes.
Aerobic - require free oxygen in the water.
Anaerobic - do not require free oxygen.

AEROBIC action is desirable, because decomposition is more complete and essentially odor free, but large lagoon areas are required. Municipal lagoons are usually of this type. For household waste disposal, see state health authorities and recommendations.

Aerobic bacteria will predominate in a pond which is relatively shallow, lightly loaded, well stirred by wind action, and free of floating straw and other solids.

An aerobic pond will be essentially odor free except perhaps following ice breakup.

ANAEROBIC bacteria will predominate in the typical livestock waste lagoon because of heavy loading rates. Odor will result. Desirable aerobic action can be encouraged with uniform loading, maximum wind action, etc.

Agricultural sodium nitrate can be used to help control odor. Add the chemical to wastes delivered to the lagoon. The amount needed will vary with local conditions - add a few pounds a day until control is obtained.

AREA REQUIREMENTS - Anaerobic Lagoons, wash water included.

Total excreta, no bedding	Surface Area
per hog	40 to 50 Sq. Ft.
per sheep*	50 to 65 " "
per horse*	300 to 350 " "
per cow*	350 to 400 " "
per chicken	1 to 2 " "
Milking & milkroom wastes per cow	50 to 60 Sq. Ft.

The figures above may be reduced to $\frac{1}{4}$ if odor can be tolerated. They can be reduced to $\frac{1}{2}$ if occasional odor can be tolerated. These lagoons are essentially open cesspools.

* Because of high roughage diets, wastes from these animals have a high lignin content. Even without bedding, decomposition will not be complete.

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EXTENSION SERVICE
UNIVERSITY OF NEBRASKA COLLEGE OF AGRICULTURE
AND U. S. DEPARTMENT OF AGRICULTURE
COOPERATING
E. F. FROLIK, DEAN E. W. JANIKE, DIRECTOR

CONSTRUCTION

The shape should be nearly round or square. Avoid narrow and elongated sections where floating material will collect due to reduced wind action.

Depth: 3' to 5' or deeper, plus 1' to 2' freeboard.

Maintain mowed, low-growing, spreading grasses on the embankments. Fence embankments to keep out animals and tresspassers. Post warning signs. Keep gate locked.

INLETS

For most livestock production units, an open inlet over the pond works well. Rodent entry is discouraged if the opening is 2' above the waterline over deep water and is covered with a flap gate.

Dribbling liquids through a free-loading inlet may freeze in the winter, and solids may plug the line in the summer. Provide a tight stopper or valve at the building, and drain gutters intermittently.

Municipal lagoons commonly are center loaded with an inlet near the bottom of the lagoon. For continuous loading under some pressure, this is excellent.

If topography requires a below-surface inlet, access to the lines for rodding must be provided. Intermittent loadings of wastes with a high per cent of solids are apt to plug the inlet pipe near the water level in the line.

Pipe: 6" to 8" sewer tile or pipe with driven or masonry joints. Open concrete trenches 6" wide can be easily cleaned if necessary, but freezing may be a problem.

OUTLETS

A trickle tube handles normal discharge. The extension into the lagoon prevents entry of floating material, but may be damaged by ice movement. A sodded side spillway prevents flooding when surface water enters the lagoon.

SEVERE CLIMATES

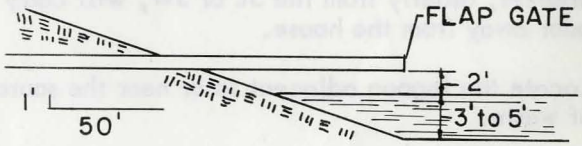
Lagoons for livestock wastes are commonly small enough to freeze over solid. In colder climates, the ice may stay solid for extended periods.

Direct loading is not usually used in severe climates.

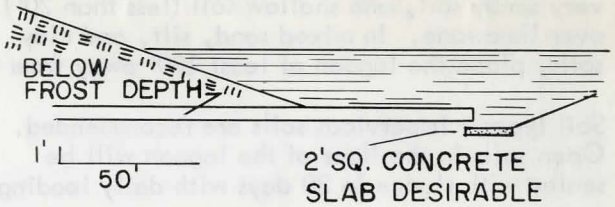
Free-loading Inlet: Partially drain the lagoon in the fall to leave room on top of the ice to provide for adequate storage. Or, provide a separate tank or other storage area into which the wastes may be loaded until the lagoon is open.

Center-loading Inlet: The surface of the lagoon must be kept open for year-round use.

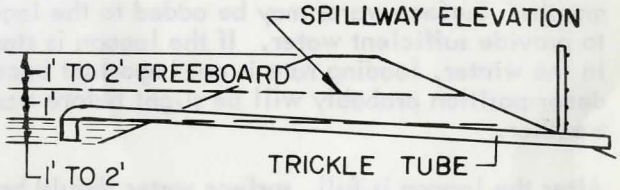
Outlet: In severe climates, the spillway is often used as the lagoon outlet.



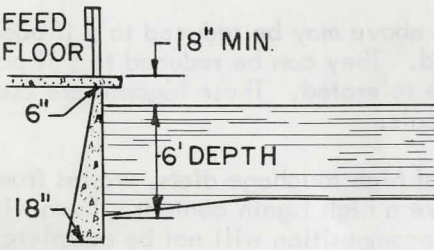
FREE-LOADING INLET



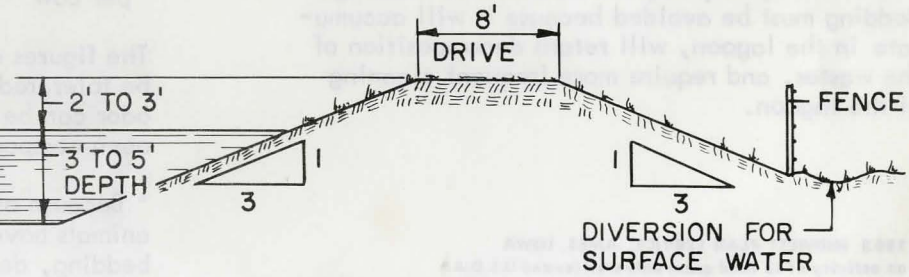
CENTER-LOADING INLET



OUTLET



DIRECT LOADING
FROM FEEDLOT



EMBANKMENT
CONSTRUCTION