

O K L A H O M A

Farm & Ranch* A* Syst

Fact Sheet 7

Reducing the Risk of Ground Water Contamination by Improving Swine, Dairy, and Beef Cattle Waste Management

Properly managing waste generated from swine, dairy cattle, and beef cattle production will go far in preventing contamination of ground water. Proper waste management of swine, dairy cattle, and beef cattle includes an animal waste management plan (AWMP). A waste management plan developed by the USDA-Natural Resources Conservation Service (USDA-NRCS) may be used on your farmstead. The specific method by which management steps are carried out depends partly on the kind and number of animals in the farm operation and the form of the animal waste (solid, semi-solid, or liquid). Manure and other waste from dairy cattle and swine are often handled as liquids.

Regulated Animal Wastes

New and existing feedlots, dairy farms, swine confinements, and other animal operations may be considered by the EPA as a Concentrated Animal Feeding Operation (CAFO). An operation is

a CAFO when more than the specified number of animals are confined for a total of 45 days or more in any 12-month period and the confinement area does not sustain vegetation (see Table 1). If your farming operation qualifies as a

CAFO, then you must obtain an EPA National Pollution Discharge Elimination System (NPDES) General Permit for storm water discharges. See your Extension agent, the Oklahoma State Department of Agriculture (OSDA), or

your district USDA-NRCS for more information on obtaining coverage under this permit.

Solid or Semi-solid Animal Waste

Location of Confined Area, Storage, and Treatment Facilities

The location of livestock waste production, storage, and treatment areas in relation to any well is an important factor in protecting your farm's water supply. Oklahoma Individual Water Well Standards state that private wells must be 100 feet from any barnyard or feedlot. The required distances between a lagoon and private water wells depends on its elevation relative to the well. Consult the Oklahoma Individual Water Well Standards for required separation distances.

Table 1. CAFO Populations

Categories	CAFOs	Potential CAFOs ¹
Slaughter or feeder cattle	1,000	300
Mature dairy cattle	700	200
Swine weighing over 55 lb.	2,500	750
Combination of animal units ²	1,000	300

¹ New and existing operations (which exceed the numbers in this column) that discharge pollutants into navigable water either through a manmade ditch, flushing system, or similar manmade device or directly into waters of the United States are considered to be a CAFO.

² Number of animal units from a combination of slaughter or feeder cattle, dairy cattle, and swine over 55 lb.

Paved vs. Unpaved Holding Areas

Paved holding areas protect ground water from animal waste infiltration, but increase stormwater runoff potential. A good runoff management system can remedy animal waste runoff problems.

Unpaved holding areas are a direct source of ground water contamination and should not be located near ground water sources. Unpaved holding areas are a particular problem in areas with thin topsoil, very sandy/gravelly topsoil over fractured bedrock, or in areas with a high water table.

Diversion

Waste generated from swine, dairy, or beef cattle operations that are CAFOs must be collected in a storm water retention system. Smaller operations may be able to dispose of wastes on a filter strip away from the animal yard or barnyard. Water from roof areas surrounding CAFOs must be collected by gutters and diverted away from any wastes. Uncontaminated runoff water from surrounding land must be diverted away from the CAFO. Contaminated runoff from animal yards must not be allowed to run directly or indirectly into ponds, streams, or lakes. Refer to CAFO regulations or check with the State Department of Agriculture, county Extension office, or USDA-NRCS district office to determine if your operation is a CAFO.

Collection and Transfer

Uncontained or spilled wastes can contaminate ground water with nutrients or pathogens. Repeated small spills that occur on shallow or porous soils or upslope from the wellhead can threaten your water supply. Care must be taken to prevent spillage of animal waste materials during transport. Avoid leaks and spills from trucks and manure spreaders onto roads, bridge areas, ditches, or creeks.

Land Application Site

The practice of spreading animal wastes only on the fields nearest the CAFO can result in excessive nutrient loading rates to the soil and possibly cause ground water quality problems. Land application areas should have less than 15 percent slopes, and applications should not be made within 25 feet of rock outcrops. There should be at least a 100 foot wide vegetative buffer strip between the application area and the nearest pond, stream, or waterway. Waste materials should not be applied near a well. Applications on frozen or waterlogged soils should be avoided.

Land Application Rate

Ensure that application rates (nutrient loads) do not exceed the plant nutrient requirements in the application area.

Honey Wagons (Liquid Manure Spreaders) vs. Sprinkler Systems

Honey wagons are relatively inexpensive, but require numerous trips to the field since they generally carry only 1,000 to 2,000 gallons. This can cause problems in keeping up with pump-out schedules and achieving the most efficient use of the nutrients. Honey wagons can be outfitted with subsurface injectors to better retain nutrients in the soil for plant production.

Sprinkler irrigation systems have several variations (hand-moved system, towed big gun sprinkler, traveling big gun, center pivot, etc.), but each includes a pump, pipes, and sprinkler(s). These systems can be relatively expensive, but they usually require less time and labor than honey wagons. If field application areas are long distances from the storage facility, a significant amount of pipe will be required.

The amount of waste applied, soil nutrient level, and soil type are important factors to consider in obtaining optimum forage or crop growth and avoiding ground water contamination. Routine soil testing and manure testing will assure field application rates are not exceeded.

Liquid Waste

Storage and Treatment Facilities

Ground water contamination can occur if a liquid storage or treatment facility allows waste to seep into soil. Liquid storage systems require the use of pumps and pipes for moving wastes. Liquid storage systems must be correctly installed and maintained to ensure that they do not leak.

Leakage From In-ground Waste Storage Facilities—Some Telltale Signs

Your liquid manure storage structure may be leaking excessively if:

- * The waste storage pit or lagoon is receiving waste and water every day, but never needs pumping.
- * If additional liquids have to be added before pits (with crust formation on surface) can be agitated and pumped.

The liquid storage and treatment facility's design and its utilization should be in accordance with USDA-NRCS technical guidelines. For example, new treatment lagoons should have proper liners.

Dairy operations that handle the manure in a slurry form may want to consider combining milking center wastes with the manure. This has the advantage of allowing a common storage location for both types of waste. A liquid manure storage facility, properly sized and constructed, provides the flexibility of storing wastes until they can be applied at appropriate times to the correct sites. If any problems with deterioration or leakage of storage facilities are suspected, the USDA-NRCS office should be contacted for assistance in correcting the situation.

Land Application

The two common methods for land application of liquid animal wastes are liquid manure spreaders (honey wagons) and sprinkler irrigation systems. Agitating the waste before hauling or during sprinkler pumping will help ensure a more uniform consistency and nutrient concentration of the waste.

There are many different sprinkler and agitation options to consider. Assistance in selecting sprinkler irrigation systems and other waste handling equipment can be obtained through county Extension and USDA-NRCS offices and through irrigation equipment dealers.

Regardless of the application system used, there should be some method of calibration and recordkeeping to determine the amount of material applied to fields. The county Extension office and USDA-NRCS district office can provide more information on storm water management and disposal, waste sampling methods, waste analysis, recordkeeping, equipment calibration, and application rates.

Contacts and References

Where to call about...

Soil Testing, Waste Analysis, Equipment Calibration, Recordkeeping, and Waste Application—Your county Extension office or the Natural Resources Conservation Service (USDA-NRCS).

Design Assistance and Technical Standards for Runoff Control Sys-

tems—Natural Resources Conservation Service (USDA-NRCS).

Animal Waste Management Regulations—Oklahoma State Department of Agriculture (OSDA).

What to read about...

Publications are available from the sources listed at the end of the reference section.

Nitrates in Soil and Water. OSU Extension Facts F-2242.

Nitrates and Groundwater: A Public Health Concern. 1988. Freshwater Foundation. The Freshwater Foundation at Spring Hill Center, 725 County Road 6, Wayzata, MN 55391, 612-449-0092.

Dairy Waste Management Regulations. (OSDA).

Dairy Housing and Equipment Handbook. Midwest Plan Service. MWPS-7. (OCES).

Stormwater Regulations for Concentrated Animal Feeding Operation. (OSDA).

Swine Housing and Equipment Handbook. Midwest Plan Service. MWPS-7. (OCES).

Oklahoma Feed Yard Act and Rules. (OSDA).

Cattle Feedlot Waste Management Practices for Water and Air Pollution Control. Texas Agricultural Extension Service. B-1671.

Beef Housing and Equipment Handbook. Midwest Plan Service. MWPS-6. (OCES).

Livestock Waste Facilities Handbook. Midwest Plan Service. MWPS-18. (OCES). *

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The Cooperative Extension Service is the largest, most successful informal educational organization in the world. It is a nationwide system funded and guided by a partnership of federal, state, and local governments that delivers information to help people help themselves through the land-grant university system.

Extension carries out programs in the broad categories of agriculture, natural resources, and environment; home economics; 4-H and other youth; and community resource development. Extension staff members live and work among the people they serve to help stimulate and educate Americans to plan ahead and cope with their problems.

Some characteristics of the Cooperative Extension system are:

- The federal, state, and local governments cooperatively share in its financial support and program direction.
- It is administered by the land-grant university as designated by the state legislature through an Extension director.
- Extension programs are nonpolitical, objective, and based on factual information.
- It provides practical, problem-oriented education for people of all ages. It is designated to take the knowledge of the university to those persons who do not or cannot participate in the formal classroom instruction of the university.
- It utilizes research from university, government, and other sources to help people make their own decisions.
- More than a million volunteers help multiply the impact of the Extension professional staff.
- It dispenses no funds to the public.
- It is not a regulatory agency, but it does inform people of regulations and of their options in meeting them.
- Local programs are developed and carried out in full recognition of national problems and goals.
- The Extension staff educates people through personal contacts, meetings, demonstrations, and the mass media.
- Extension has the built-in flexibility to adjust its programs and subject matter to meet new needs. Activities shift from year to year as citizen groups and Extension workers close to the problems advise changes.

*Partial funding for the cost of printing the Farm & Ranch*A*Syst publications was provided by a grant from the Environmental Protection Agency, Region 6.*

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Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Charles B. Browning, Director of Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Dean of the Division of Agricultural Sciences and Natural Resources and has been prepared and distributed at a cost of \$164.40 for 750 copies. #1161 0495 MSC