

Confined Feeding Facilities

Site Selection and Management

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Recently, lawsuits against owners of confined livestock and poultry feeding units have not been uncommon. In many cases, penalties have been assessed. Proper attention to *site selection* when the project was started could have prevented much of the litigation. Many operators could have paid more attention to management, or "housekeeping," and avoided the problem.

This guide presents two recent court cases which illustrate the importance of site selection and management. It also offers some general guidelines for selecting a confined feeding facility site and for the management required to reduce odor and water pollution problems.

What Is Air Pollution?

Air pollution as defined in state law is *the presence in ambient (outside) air of contaminants, which cause injury to plant, animal or human life or property, or which unreasonably interfere with the enjoyment of life or use of property.*

The Air Pollution Control program had its beginning in 1965 when the Missouri General Assembly passed the "Air Conservation Law." The program is administered by the Missouri Department of Natural Resources. Their job is to control air pollution in the state.

Prior to 1965, lawsuits of this kind were tried between private parties under the common nuisance law. No state agency interceded as in Case A, where the suit was brought by the state.

Although individuals seeking relief from air pollution can still have their attorney file a lawsuit under the common nuisance law, there is an alternative to litigation. The Department of Natural Resources—Air

Case A

Case A illustrates how the court ruled on a particular odor problem.

In midsummer 1975, over 100 residents complained to the Department of Natural Resources of strong, objectionable odors coming from a nearby confined swine operation. A representative of the Air Pollution Control Program investigated the complaints over a period of several months and determined that odors were above the acceptable level as measured by a scentometer.

Owners of the 3300-hog-feeding facility were directed to take corrective action within a certain time period as outlined by a consulting firm. Problems continued to occur, and by 1979, the Attorney General, acting on behalf of the Department of Natural Resources, initiated litigation against the hog-feeding firm, asking for injunctive relief and penalties.

The plaintiffs dropped the request for an injunction but the court assessed a \$3,500 penalty against the owners of the hog-feeding facility for odor violations. The court also stated that even though that penalty was assessed, it did not affect the rights of those who suffered from the odors to seek recovery from the defendant for their individual damages, thus leaving the door open for additional litigation.

In Case A penalties were assessed because of odor problems or air pollution. The circuit court determined that the operation of a hog-feeding facility had violated state law covering *air pollution*.

Pollution Control¹ will investigate and help resolve the problem without litigation if possible. If unsuccessful as in Case A, the agency working with the Attorney General is authorized to file a civil suit to determine whether a violation has occurred.

In Case A, the hog-feeding facility was located close to many rural residents. The fact that over 100 people signed the petition indicated that complaints were widespread, and this encouraged the state regulatory agency to act. If the hog-feeding facility had been located a greater distance from the residents, the probability of odor problem would have been reduced. In this case, residents felt odors from the hog-feeding facility unreasonably interfered with their right to enjoy life and to use their property. The court agreed.

Management of the facility also played a part in the outcome of this lawsuit. The state agency ordered that the lagoon be emptied within 10 days and abandoned and that waste be applied to land farther away. Management did not empty the lagoon within 10 days. Moreover, they sprayed the contents of the lagoon on a hay field, which caused neighbors to suffer "discomfort, nausea, frustration and aggravation."

What Is Water Pollution?

A brief and useful definition of water pollution is *depositing or causing anything to be deposited in either surface or sub-surface water that unreasonably interferes with its use by others.*

The water pollution control program is also administered by the Department of Natural Resources. For a more complete discussion of water pollution laws and regulation, see UMC Guide 850 "Water Pollution Laws and Regulations for Animal Waste Management."

In Case B, the hog-feeding facility was located on a rolling, stony and porous soil, which requires lighter applications of waste. Concentrated pit waste was applied to a soil-plant filter area in quantities which killed the vegetation and the soil-plant filter could not function. Moreover, heavy rain washed the waste into nearby streams. When applications of waste are made properly, plants remove some of the nutrients and filter the runoff. Leakage from the lagoons and pit was also a factor in the underground water pollution.

Location and management of the confined feeding facility can prevent odor problems and water pollution. If a disagreement goes to court, it must decide who has the greater right—the animal producer, the nearby residents, or the downstream residents if water pollution is the issue. Ask yourself whether you would like a hog confinement unit, which discharges waste into the water supply, across the road from your residence. Then, plan your own facility according to the way you would like to be treated.

¹P.O. Box 1368, Jefferson City, Missouri, 65101.

Case B

Case B is an example of a court ruling on a water pollution problem.

Citizen complaints to the Department of Natural Resources of water pollution from a confined swine production facility brought an investigation by the Water Pollution Control staff. Lab tests confirmed that there was indeed water pollution in streams, springs and wells. After further investigation of the facilities and the method of waste disposal, the agency found that the geology of the area was such that pollution of stream, springs and wells could occur unless management followed a carefully designed plan in the collection and disposal of animal manures.

Further investigation showed that even though a soil-plant filter was a part of the plan, heavy application of concentrated pit waste had destroyed the vegetation. Concentrated pit waste applied to rolling bare land prevented the soil-plant filter from functioning effectively. In addition, unsealed lagoons and cracks in the concrete pits permitted leakage into the porous soil found in that area. Three springs downslope from the lagoons were running grey-black, odorous water, which deposited black sludge on the gravel stream bottom. This polluted water then disappeared into the ground water as the stream went underground.

The circuit court assessed a penalty of \$5,000 plus costs against the hog producer. In addition, the court ordered that a plan for operation and maintenance be developed with the aid of a geologist within 30 days to prevent underground water pollution. The defendant was required to collect samples from springs, wells and streams and to have them analyzed to determine whether water pollution was continuing to occur.

In this case, the court determined that the operation of the confined hog-feeding facility had violated state laws on *water pollution*.

Site Selection

Site selection for livestock production facilities is the best way to minimize the potential for future odor and water pollution problems. Many environmental problems could be avoided if livestock producers exercised better judgment in locating their facilities. Selecting a site to minimize odor problems involves such factors as air movement, distance from neighbors or property line, size of operation and the visibility of facilities.

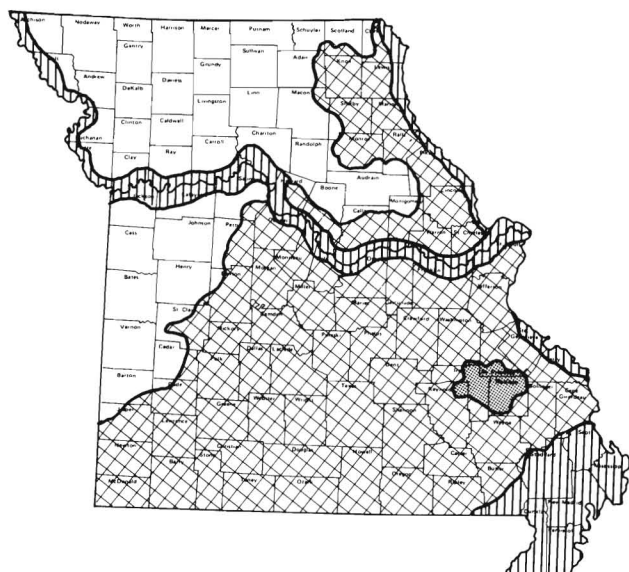
When selecting a site to minimize the risk of water pollution, consider the geologic properties of the terrain on which the waste impoundment will be con-

structured, distances to wells and streams and the availability of a suitable soil-plant filter to receive the waste.

Air movement. Traditionally, the direction of prevailing winds has been the first consideration in selecting sites for livestock production facilities. However, investigation of many odor complaints indicates that odors in still air move horizontally or downhill in a "drainage" pattern similar to water. Because of the still air, odors flow in a relatively undisturbed "streamline." Since little dilution of the odor takes place under these conditions, the odor intensity at some distance away from the source can be nearly as great as the intensity at the source.

In selecting a site, consider not only wind direction but also the elevation of the production facility relative to that of surrounding dwellings. Avoid sites where downhill terrain would provide a "channel" for odors to move from the source to a nearby residence.

Figure 1.
Areas where potential groundwater pollution may restrict location of waste management facilities.



- Zone 1: Little or no pollution problems; may be poorly drained
- Zone 2: Flood plain; high water pollution potential
- Zone 3: Limestone deposits may provide high pollution potential
- Zone 4: Little or no soil for impoundment construction.

Specific soil and geologic evaluations are recommended for sites located in Zones 2, 3, and 4.

NOTE: The map is from an existing publication printed by UMC under 208 contract. "Missouri Homeowner's Guide To Septic Tank Use", Jan. 1980, Department of Natural Resources and Missouri Division of Health.

Check List For Site Selection

- Topography
- Air Movement
- Facility Size
- Soils and Geology
- Soil-Plant Filter
- Management Level
- Wells and Streams
- Visibility of Facilities
- Property Line Location
- Neighbors' Location/Attitude
- Potential Development
- State and County Roads
- Public Use/Access Areas
- Waste Management Facilities

Prevailing winds are important. South to southwest winds are prevalent in most of Missouri, so residents to the north and northeast of livestock production facilities are most likely to complain of odors.

Facility size. Facility size, or the number of animals, is an important consideration in evaluating odor potential. Predictions of odor levels or intensities based strictly on numbers of animals are very difficult to make. However, it is probable that the larger the facility, the greater the odor production. Most of the severe odor problems in Missouri have occurred at relatively large swine operations (400 sow-farrow-to-finish or larger). Anticipate future expansion when you are evaluating odor production potential.

Visibility of facilities. Highly visible livestock production facilities are subject to more odor complaints than facilities which are screened or hidden from view. Select sites with minimal visible contact with neighbors, public roads and passers-by. Invisibility will not eliminate the possibility of odor complaints, but facilities, which cannot be viewed by the public, are less likely to receive odor complaints.

Distances from odor sources. Unfortunately, there is no means of evaluating the necessary distance between production facilities and residences which will eliminate the risk of odor complaints. Consider all factors to making a judgment on safe distances.

Two considerations are property lines and non-owned residences. In Missouri, the regulatory agency takes odor measurements at the property line when investigating a possible violation. Even though there are no non-owned dwellings within odor-detection range, the agency may still issue an odor violation on the basis of measurements taken at your property line.

Also, when facilities are located within odor-detection range of your property line, you need to evaluate the potential for any type of residential development across the property line. "Being there first" may help but does not guarantee immunity from legal procedures arising from odor complaints.

Table 1 shows separation distances which have

Table 1. Guide for Estimating Separation Distances. Values in table are for estimation only. Distances greater than those shown do not necessarily guarantee success, and distances less than those shown may not necessarily guarantee failure.

Number of Finishing Hogs or Beef Cattle	Unacceptable to Poor	Separation Distance (Feet)	
		Poor to Fair	Fair to Good
500	0-250	250-500	greater than 500
1000	0-350	350-750	greater than 750
1500	0-450	750-900	greater than 900
2000	0-500	500-1000	greater than 1000
2500	0-600	600-1200	greater than 1200
3000	0-750	750-1500	greater than 1500

To estimate separation ratings from non-owned residences multiply distances by 2; for residential development or public recreational areas multiply distance by 4.

yielded reasonably few odor problems, if the items in the *Checklist for Site Selection* can be answered in a positive manner. If some of the items in the checklist reflect potential odor problems, the separation distances in Table 1 may need to be increased. In any case, many factors besides separation distance contribute to potential odor problems. Use the table with this in mind.

In the absence of proven criteria, considering your neighbor's rights is the best guide for estimating safe distances to non-owned dwellings. Have an open mind. If you see the potential for offensive odors, chances are your neighbor will, too.

Geologic properties of terrain. Locate an earthen waste impoundment on soil which will easily seal to minimize the risk of groundwater pollution. Much of the southern half of Missouri has highly permeable, gravelly, rocky, sandy or blocky-structured red clay soils, which may allow wastes to seep into the groundwater. In such areas, ask for specific recommendations from specialists in soils and geology. Take special precautions, such as over-excavation and backfilling with a compacted clay layer, to minimize the risk of groundwater pollution. The cost of constructing adequate earthen waste impoundments on this type of terrain will be greater than for construction on good clay-type soils. See the map in Figure 1 to locate areas where soil and geologic evaluation are recommended.

Distances to wells and streams. There are no regulations specifying the necessary distance between sources of contaminants and private water supply wells. Apply the guidelines currently used for public water supplies. These criteria are:

1. For wells drawing from bedrock formation with casing sealed, 300 feet is recommended and 100 feet is the minimum distance.

2. For wells drawing water from unconsolidated formation, (sand, gravel) or unsealed wells, 1000 feet is recommended and 300 feet is the minimum distance.

You can situate earthen waste impoundments near streams with little risk of stream pollution if they are properly constructed and managed. However, recog-

nize that such an arrangement would be sensitive in the case of waste overflow, and that future expansion is often curtailed by locations too close to a stream. Do not locate impoundments in an area that floods more often than one in 10 years.

Availability of soil-plant filter. A suitable soil-plant filter is necessary for final distribution and utilization of livestock wastes. The proper application of wastes to a soil-plant filter area, sized for the number of animals in the facility, will insure a minimal water pollution risk. Locate facilities so that transporting and distributing wastes to the soil-plant filter is within your management and equipment capabilities. With solid or liquid manure hauling systems, you may be able to use soil-plant filter areas farther from the facilities. However, these systems require more labor and management. Irrigation systems require less labor and management input, but the soil-plant filter must be located relatively close to the waste impoundment.

System Management

After approved facilities have been built, proper management and operation of the facilities will reduce the risk of air and water pollution. Good housekeeping is still the most effective means of minimizing odor production, regardless of facility type.

Reducing odor levels. Some management and operational techniques can be employed to reduce odor production in existing facilities. Good housekeeping minimizes the time raw manure has contact with the atmosphere. Odor emission studies indicate that frequent manure removal and deposition into storage/treatment facilities such as a lagoon or pit significantly reduces odor emissions.

Lagoon odor can often be reduced by aeration, covering the lagoon, or reducing the waste load on the lagoon. Aeration requires the use of a mechanical device, usually a pump or blower, or combination of the two, to introduce atmospheric air into the lagoon. This process allows the growth of facultative or aerobic bacteria and creates an environment in which wastes

are stabilized with relatively little odor emission. The disadvantages of aeration are a high initial investment and significant operating costs.

Lagoon covers can also be effective in reducing or eliminating odors. Unfortunately, most commercially available covers at present are too costly to make them a feasible alternative. An exception is the natural cover or crust which develops on dairy lagoons as a result of fibrous material (hay or silage) in the ration. Lagoons with this crust generally emit little or no odor.

Reducing the waste load on a lagoon will usually result in a corresponding reduction in odor. Lagoons become overloaded when producers expand their facilities without expanding the lagoon capacity. Reduce waste load by building additional lagoon capacity or by removing some fraction of the solids from the waste flow received by the lagoon. Typical solids separation techniques include settling, screening, or a combination of screening and pressing. These techniques can remove up to 50 percent of the solids.

Odors emitted during waste distribution should be a primary consideration in management of spreading operations. During both surface spreading (liquid or solid) of manure and irrigation of lagoon effluent, there is considerable contact between waste and the atmosphere. Conduct waste distribution operations when climatic conditions are conducive to odor dilution and dissipation. Dry, gusty or windy days usually provide quickest odor dilution, while still, damp air allows odors to accumulate and concentrate.

Managing to minimize water pollution risk. Plan carefully to insure that waste impoundments do not overflow. You should initiate irrigation or hauling operations before waste impoundments are completely filled, so climatic conditions (rainy periods, wet soil) do not force delays in waste distribution. Apply wastes to the soil-plant filter at rates which prevent runoff and which take the crop's ability to absorb nutrients into consideration.

Managing Large Facilities

Studies of air and water pollution cases indicate a number of problems common to larger facilities.

Corporate or "big business" image. Large complexes or corporate-type facilities are more likely to receive complaints. In some cases, a complaint may be the plaintiff's outlet for expressing reaction to the facilities.

Outside investors. Facilities financed by non-local investors are more susceptible to complaints. Local residents may feel they are "putting up with the odor," while outside investors reap the benefits.

Facilities not located on the investor's land. Corporate facilities are sometimes constructed on a

purchased tract of land at some distance away from land owned by the investors. Plaintiffs feel that such facilities should have been constructed on the investor's property instead of a purchased tract of land in "their" community.

Facilities on a small tract of land. A fairly common procedure for large corporations is to purchase a tract of land only large enough to accommodate the physical location of the facilities. Under such conditions, there is little opportunity for odor dilution or dissipation between the odor source and property line. Further problems arise in locating non-owned land where wastes can be spread.

Poor initial public relations. Complaints are more likely to arise if the neighbors were not informed of the plans to construct a confined feeding facility. Community reaction to construction may not be positive, but potential plaintiffs will not feel they were uninformed if advance information is available.

Poor initial system management. Often, owners or operators do not know how to handle the new facility. They need time to develop optimal management capabilities.

Make every effort to insure proper system management from the beginning. A common mistake is to begin loading a lagoon with manure before sufficient water volume has accumulated for the development of bacterial population. Plan ahead to have a sufficient volume of water in the lagoon before starting facility operation.

Owners and managers of "larger-than-average" facilities should realize that they will not be judged by the same standards as the "average-sized" facilities in a community.

Preventing Air and Water Pollution

Prediction, measurement and evaluation of the impact of odors from livestock production facilities is a crude science. But a few time-tested rules can prevent air and water pollution problems.

- *Do unto others as you would like them to do unto you.* An honest evaluation of your neighbor's position provides a perceptive viewpoint.
- *An ounce of prevention is worth a pound of cure.* After problems occur they are almost never resolved to the satisfaction of both operator and plaintiff.

Pre-planning and obtaining assistance from experts are the keys to developing a production system which is socially and environmentally acceptable. In Missouri, the Department of Natural Resources, the University of Missouri Extension Service and the U.S. Soil Conservation Service cooperate to provide assistance to livestock producers.

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