

# Environmental Standards of Production for Larger Pork Producers in Pennsylvania

PENNSTATE



College of Agricultural Sciences  
Cooperative Extension

# Table of Contents

## **Chapter 1 Site Evaluation and the Permit Process**

- 5 Initial Site Evaluation
- 6 Select the Site of Choice
- 7 Secure Permits
- 7 Public Meetings
- 7 Closure

## **Chapter 2 Summary of Nutritional Recommendations**

- 8 Introduction
- 8 Nutrients of Concern
- 9 Nutrition-Based Strategies and  
Potential Solutions

## **Chapter 3 Construction and Emergency Response**

- 11 Construction Standards
- 12 Emergency Response

## **Chapter 4 Biosecurity and Herd Health**

- 18 Introduction
- 18 Biosecurity
- 19 Herd Health Management

## **Chapter 5 Monitoring**

- 20 Introduction
- 20 Monitoring for Environmental  
Stewardship
- 21 Monitoring Checklists

## **Chapter 6 Mortality Disposal**

- 22 Introduction
- 22 Rendering Service Removal
- 22 Composting
- 22 Incineration
- 22 Burial

## **Chapter 7 Community Impact**

- 23 Introduction
- 23 How Swine Enterprises Directly  
Benefit Communities
- 24 Local Challenges to Swine  
Production

## **Chapter 8 Good Neighbor Policy**

- 26 Introduction
- 26 Information Dissemination
- 26 Farm Appearance and Visitation
- 27 Nutrient Application
- 27 Operational Issues
- 27 Neighborhood Activities

## **28 Appendix: References**

# Preface

**S**ince the early 1980s, animal agriculture has evolved from small, family owned and operated production facilities to larger, more intensive enterprises. This evolution has been brought about by the globalization of agriculture and economies of scale. Pork production facilities also have increased in size, and large operations now account for the majority of the pigs raised in the United States. It appears that this trend will continue.

The purpose of this manual is to provide planning agencies, township supervisors, regulatory agencies, and hog farmers themselves, with a tool to gauge plans for developing a new swine farm, or for expanding or improving an existing site. The manual was developed by a diverse group of people representing businesses, universities, and agencies committed to the viability and success of Pennsylvania's swine industry. Input was solicited from many public and private groups before finalization. Comments were carefully considered in preparation of the final document.

The manual consists of eight chapters covering aspects of developing and managing a swine farm. The siting chapter provides guidelines and considerations for those purchasing a farm with the intent of building a large (over 300 animal units) swine facility. Many of the remaining topics covered in the manual are not necessarily applicable to small, or even medium-sized farms. We recommend that three criteria be taken into account in evaluating to whom the remainder of this document applies.

## **(1) Liquid manure**

Much of the manual relates specifically to swine enterprises using liquid manure systems. All producers constructing new liquid manure storages should follow the guidelines in Chapter 3 (Construction and Emergency Response) and the *NRCS Pennsylvania Technical Guide*. Other chapters relating to liquid manure include Chapters 5 (Monitoring), 7 (Community Impact), and 8 (Good Neighbor Policy).

## **(2) Density of animals**

Pennsylvania's Nutrient Management Act considers all livestock operations housing at least two animal units (2000 pounds) per acre of land available for manure application as Concentrated Animal Operations (CAOs). All CAOs are required by law to have a nutrient management plan. Operations falling under CAO regulations should specifically reference Chapters 2 (Summary of Nutritional Recommendations), 3 (Construction and Emergency Response), and 5 (Monitoring).

## **(3) Total number of animals**

Operations may have significant numbers of animals, yet may not be classified as CAOs. Operations housing more than 300 animal units should consider adopting the recommendations found in this manual.

The management practices discussed in this manual are in no way designed to carry any regulatory weight. They are simply an interpretation of the best ways to conduct a swine production business given current scientific, regulatory, social, and economic constraints.

Swine producers are currently regulated by the following state, federal, and local acts and statutes:

Pennsylvania's Nutrient Management Act—governs manure application

Federal Clean Water Act—prohibits pollution of waterways

Pennsylvania Clean Streams Law—prohibits pollution of waterways

The Sustainable Agriculture Act—encourages technologies to improve soil and water for future generations

Domestic Animal Law—ensures proper animal care, disease control, and mortality disposal

Flood Plain Management Act—controls placement and construction standards for manure storages built on a flood plain

Wellhead Protection Areas—prohibits manure application near public wellheads

Right to Farm Law—protects standard agricultural practices

Pennsylvania's Pesticide Control Act of 1973—regulates use of pesticides for agricultural purposes

Municipal Planning Codes including Local Building Permits, Local Land Development or Land Use Plan, Local Nutrient Management Ordinances (consistent with PA Nutrient Management Act), Local Flood Plain Ordinances, Local Zoning Ordinances.

The manual only peripherally addresses nutrient management. Please refer to Pennsylvania's Nutrient Management Act for nutrient management requirements in Concentrated Animal Operations. Local laws and ordinances may not be more restrictive than those set forth in Pennsylvania's Nutrient Management Act. More general requirements for manure handling and application can be found in *Manure Management for Environmental Protection* (October 1986) or subsequent publication.

It is our hope that this manual will increase the understanding of developing, constructing, and managing Pennsylvania's swine farms for the good of farmers, local communities, the environment, and Pennsylvania's agriculture industry.

# Chapter 1

## Site Evaluation and the Permit Process

### Initial Site Evaluation

#### Informal evaluation

This can be done by the future owner of the facility, the developer, or an employee. Consider the neighbors' cultural background, their personal values, and time of residence. Envision where the facility might sit and estimate how far it will be from nonagricultural uses by reviewing topographical maps of the site. Note other land uses in the area, the degree of maintenance, and the quality of development in the area.

#### Local zoning and code requirements

Visit the county planning and/or township offices to secure all information and requirements needed for swine (or livestock) facility construction. Be certain that you understand the full extent of all ordinances and local planning regulations. New swine facilities may be considered a land development, which subjects them to regulations regarding storm water management, isolation distances, uniform setback lines, site improvements, etc.

Secure an option to buy, if possible  
Make the seller part of your team.

#### Independent audit

Consider having a third party evaluate the site's impact on neighborhood aesthetics, odor potential, and environmental and visual impact. The auditor(s) should be knowledgeable in swine production and objective in their approach. Extension swine specialists, county extension agents, or NRCS personnel generally are qualified people who could provide this service. In

their evaluation, the auditor(s) should consider the following criteria for assessing community impact:

#### **Distances to residences, businesses, churches, schools, and recreational uses**

Isolated facilities elicit few odor complaints. Furthermore, in areas with effective agricultural zoning, ordinances are rigorous in prohibiting nonfarm structures, particularly residential developments, in areas where agriculture is the principal activity.

#### **Prevailing wind**

Inexpensive, reliable wind monitors can document wind directions over time. The most critical wind direction is that observed during warm weather when neighbors have open windows in their home and participate in many outdoor activities. Most landowners will know the prevailing wind direction during the summer months. Generally, these winds will be northwesterly or southwesterly. Note that the location of the swine facility and the manure storage (if separate from the swine facility) must be carefully considered. Because these two components will produce odor emissions continuously, their location is actually more important than the location of fields that will receive manure.

#### **Path of odors during thermal inversion**

During cool, still nights air temperatures often are "upside down" or inverted from what is normally observed during the day. Cooler air is near the ground, while warmer air is found at higher altitudes. Under these conditions, odors also stay near the ground and can travel significant distances from the facility with only

minimal dilution. Examine the site and determine where exhaust air would drain as it leaves the facility—it follows the same drainage path as that of surface water. Carefully consider the distance to the nearest neighbors in this path.

#### **Topography**

Odor plumes traveling across flat terrain will undergo less turbulence and dilution compared to that of hilly countryside. The topography also determines the path of odors during thermal inversion.

#### **Obstructions in the path of exhausted air**

Shrubs, bushes, and trees near exhaust fans provide limited help. Groves of trees near fans provide moderate odor reduction. Wooded areas (through which other buildings can't be seen) offer maximum odor reduction.

#### **Type of manure storage**

The manure storage system will influence odor production. Systems used in the United States are:

*Outside manure basin*—This is a typical storage system used in Pennsylvania. Manure is stored in high concentration, which leads to some odor emissions. It also is subject to wind stripping (wind removes the odor compounds immediately above the surface, allowing more compounds to be volatilized). These storage systems also are subject to absorption of solar radiation, resulting in increased temperature and odor emissions. Some producers use a two-stage system, in which the primary stage serves as a settling basin, and the secondary stage stores the dilute effluent. The higher

solids content in the primary storage enables producers to economically transport the manure farther distances. The liquid in the secondary stage can be applied nearby at higher application rates since its nutrient concentration is lower. However, soil types and topography should be considered when applying low-concentration effluent at high application rates.

*Deep pit*—In deep pit systems, manure is stored directly under the building. Like outside manure basins, manure is stored in high concentration and has similar odor potential, but there is no wind “stripping” or solar absorption. Therefore, odor emissions will be slightly less from deep pits than from outside manure basins. Note, however, that pits are more difficult to monitor and inspect than outside storage systems and may be more difficult to repair, if required.

*Treatment lagoon*—These manure storage systems do not function well in Pennsylvania because of its cool climate. Treatment lagoons, because of their higher biological activity, release more methane, ammonia, and hydrogen sulfide, but generally emit less volatile organic compounds. Therefore, when a lagoon is functioning well, odor production is less when compared to other storage systems.

#### **Manure storage covers**

Covers help to contain odor emissions and also reduce nitrogen volatilization. Odor emission reduction has obvious benefits. By maintaining a higher nitrogen concentration in the manure, the nitrogen:phosphorus ratio more closely matches the ratio required by crops. This reduces phosphorus buildup in the soil. Unfortunately, polymer covers for large storage systems are expensive and subject to problems associated with rain water, ice buildup, and potential wind damage. Floating organic covers (leaves, straw, etc.), are practical on a small scale, but often are not used extensively for large storages. However, both types of covers are gaining more attention from both academic and private sectors. As technology develops, more options will become available.

#### **Visibility of the swine unit**

If the unit is hidden by trees or topography, residents are less likely to voice complaints.

#### **Local officials and/or the conservation district input**

Knowledge of the land-use history of the site and availability of land suitable for manure application can influence site selection.

#### **Water**

The site must have adequate water resources, yet be far enough away from a permanent water source to ensure security of the unit in an emergency. Things to consider:

- water availability
- depth to water table
- distance from wetlands
- soil type
- hydrology
- watershed characteristics

#### **Community infrastructure**

Infrastructure will influence the cost of the facility and access to the site. Well-maintained roads are important for transportation of feed and hogs. Access to utilities, especially electricity, must be considered. Identify local businesses available to purchase items and services.

#### **Areas for application of manure**

Many large swine operations will export manure to other farmers, which is a beneficial arrangement for both parties. Note, however, that exporting manure to nearby farmers often is regarded by the public as an easy way to dispose of waste. Be certain that you have adequate acreage for applying manure responsibly. Firm arrangements with cooperating farmers can help to alleviate public concerns that neighboring lands may suddenly be unavailable for manure application.

## Select the Site of Choice

Prepare site-specific plans for the following (as required by local and state regulators):

- Erosion and sediment control
- NPDES (National Pollutant Discharge Elimination System)—A general permit is required only when more than five acres of earth are disturbed during construction. An individual permit will probably be needed for operations housing greater than 1000 animal units.
- Nutrient management plan
- Clean Streams Law Part II Permit (if required)
- Construction plans specific to the site, soils, and geology
- Emergency preparedness and aspects of the operation that will be monitored daily (See Chapter 5)
- Mortality disposal
- Conservation plan for the farm, if needed

The producer also may have to submit a land development plan, which requires a two-stage process (preliminary and final plans). The plans often include storm water management and the cost of on-site improvements. Note that the review of the plan is open to the public.

Inform local ag leaders about the project

Include local units of state and national agricultural organizations.

Contact and inform members of legislature and their staff

Take support staff to the site.

## Secure Permits

During the application process, provide municipal officials with copies of all required documents, which may include:

- Erosion and sediment control plan
- NPDES (National Pollutant Discharge Elimination System)
- Nutrient management plan
- Clean Streams Law Part II Permit (if required)
- Emergency preparedness plan
- Mortality disposal plan
- Conservation plan
- Zoning, subdivision, and land development permits

Inform local municipalities that you are working with the conservation district.

## Public Meetings

If a public meeting is needed, the best time would be during the application process. If a public meeting would be helpful earlier in the process, then one should be held. (Note that if there is a local subdivision and land development ordinance (SALDO), public hearings will have already occurred prior to this point in the process.) In some situations, consideration should be given to sponsoring a facility tour before the unit is populated.

## Closure

Provide a plan for closing the facility (either permanently or temporarily), including:

- Empty manure storage according to nutrient management plan.
- Empty facility of all attached hog equipment.
- Provide water test history of the wells, in addition to a current test.
- Remove manure storage liner and take to a landfill.

# Chapter 2

## Summary of Nutritional Recommendations

### Introduction

The pork industry has shifted from small, backyard herds to large, more resource-efficient operations. This shift has occurred for a number of reasons, including increased world food demands, economies of larger scales of production as well as the high cost and limited availability of land.

Precise feeding programs are significant keys to successful nutrient management in these large-scale operations. Nutritional technologies are available to reduce both nutrient excretion and limit land requirements for nutrient application. Up-to-date research information will impact the animal's diet, nutrients lost in manure storage, the land application of those nutrients, and the amount and proportion of nutrients available to plants.

### Nutrients of Concern

#### Nitrogen

Nitrogen (particularly nitrate) has been identified as a major concern in ground and surface water contamination. In addition, the emission of excess ammonia into the air from agriculture can contribute to increased nitrogen deposition from rainfall.

When nitrogen is applied to the land in correct amounts and at proper times, it poses little environmental risk because plants require nitrogen for growth. However, excess nitrogen applied through manure, commercial fertilizer, or even from decomposing organic matter serves as a substrate for microorganisms that convert nitrogen to ammonium ions. Some ammonium ions are released into the atmosphere as ammonia, but when this happens outdoors, concentrations are rarely detectable by humans. Nonvolatilized ions are further oxidized to nitrate, which can potentially leach through the soil and contaminate ground water. Nitrates also can contaminate surface water by direct runoff into waterways.

#### Phosphorus

Phosphorus also is essential to plant growth. Normal applications of phosphorus are relatively harmless. Note, however, that when manure application rates are based on nitrogen, the amount of phosphorus applied will often exceed the requirements of the crop. When applied in excess, soluble phosphorus along with phosphorus attached to soil particles can run off into surface water. There, it can

greatly stimulate the growth of algae and other aquatic plants, resulting in an unhealthy environment for fish and other water life.

#### Minerals

Questions about the long-term use of copper, zinc, and sodium also have been raised regarding soil toxicity and ground water safety. In the past, these nutrients were added to animal diets at concentrations sufficient to provide a margin of safety. Modern inclusions more accurately match mineral levels in the feed with animal needs.

Copper and zinc are sometimes added to the diet at levels that greatly exceed the nutrient requirements of the pig. High concentrations of both copper (up to 250 ppm) and zinc (up to 3000 ppm) have been shown to enhance growth performance and feed efficiency, especially in young pigs. However, these concentrations should not be fed to pigs weighing more than 45 pounds. Older pigs who consume high levels of copper and zinc do not respond as well, and they have a much higher feed intake, which will contribute to more excretion and increased trace elements in the soil. High concentrations of trace elements do not appear to result in higher mineral uptake by crops such as corn and soybeans. However, in the case of vegetable crops for human consumption, near-neutral pH must be maintained to prevent abnormally high trace element uptake.

## Nutrition-Based Strategies and Potential Solutions

### Overview

Nutrients needed by animals for growth include amino acids, fatty acids, carbohydrates, water, minerals, and vitamins. Nutrition involves a series of processes whereby an organism consumes and assimilates food for growth, as well as for replacing worn or injured tissues. Obviously, not all consumed nutrients are used for these purposes; some are excreted in manure. The goal of modern nutrition is to precisely match animals' genetic potential with the nutrients contained in feed so that nutrient excretion is minimized. Of special importance are those nutrients that, in excess, may be potentially harmful to the environment. The following nutritional strategies are used to reduce nutrient excretion.

### Amino acid feed formulation

Traditionally, livestock feed was formulated on a "crude protein" basis. Since crude protein is composed of a variety of amino acids, which contain nitrogen as a major component, some amino acids were fed in excess of the animal's requirements. Certain amino acids are considered "essential" and must be included in the diet. Nutritionists have identified these essential amino acids and can formulate diets to precisely meet the pig's need for essential amino acids at various production phases.

In the animal, consumed proteins are broken down into amino acids. Essential amino acids are used in their consumed form for tissue growth. Excess amino acids are reduced to their components—carbon and nitrogen. Carbon is used by the animal as an energy source. Excess nitrogen from amino acids is excreted in the urine. To reduce the amount of excreted nitrogen, the amount of dietary nitrogen (crude protein or amino acids) must be reduced. Therefore, if diets can be formulated for specific essential amino acids (e.g., lysine, methionine, threonine, and tryptophan), there is less excretion of urinary nitrogen.

For example, a diet with a reduction in crude protein by as many as four percentage points (16% vs. 12%), and supplemented with specific synthetic amino acids, can significantly decrease nitrogen output without impacting pig growth performance.

One disadvantage to decreasing nitrogen excretion is the reduction of the N:P ratio in manure to less than 1:1. Ideally, plants need a N:P ratio of about 2.5:1. Concurrent reductions in phosphorus excretion will help bring this ratio closer to the needs of the plant.

Formulating diets on the basis of amino acid requirements has been available to Pennsylvania swine producers for over a decade. As additional synthetic amino acids become available, they should be included in the feed formulation process to obtain further reductions in nitrogen excretion. We suggest that all pork producers use amino acid balanced diets as the primary basis for all feeding programs.

### Precise formulation and phase feeding

In addition to using synthetic amino acids to reduce crude protein and nitrogen excretion, diets should be formulated for the specific genotype, sex, and size of pig. Genetically leaner, more heavily muscled pigs require higher concentrations of essential amino acids than fatter, lighter muscled pigs. Female pigs (gilts) require more nutrient-dense diets than castrated male pigs (barrows). Also, concentrations of dietary nutrients should be decreased as pigs grow. This technique is called phase feeding. Swine producers should know the genotype of their pigs, consider split-sex feeding, feed by phases, then formulate diets accordingly to limit nutrient excretion.

This concept also can be employed in lactating swine. Diet formulation based on total feed intake should be used to reduce nitrogen excretion during lactation.

### Phosphorus-reduced diets

Phosphorus has traditionally been added to swine diets at levels 20 to 30% above the animals' requirements. This practice has been generally accepted to provide a margin of safety for adequate bone formation.

With improved genetics resulting in much shorter grow-out periods, it is becoming less important to develop long-term skeletal strength. Current feeding trials indicate that a 20% dietary phosphorus reduction (from the concentrations typically fed) is possible without any negative effect to finishing pigs. Producers are encouraged to follow recommendations of the National Research Council for dietary phosphorus needs.

### Phytase-supplemented diets

Pigs can only digest about one-third of organic phosphorus present in feed grains and oilseed meals. Therefore, up to two-thirds of the phosphorus from organic sources is excreted in the manure. Since so much of the organic phosphorus is unavailable, extra inorganic phosphorus, which is more digestible, must be included, bringing the total amount of phosphorus in feed well above the needs of the pig.

One of the best ways to reduce phosphorus excretion is to supplement the diet with phytase, an enzyme not naturally present in monogastric animals. The addition of phytase makes organic phosphorus more digestible and limits the amount of inorganic phosphorus that must be added to the diet. Studies have shown that phosphorus excretion can be reduced by 20% or more through the use of dietary phytase.

Pennsylvania has been a leader in the use of phytase supplements. Research sponsored by the Pennsylvania Department of Agriculture and PennAg Industries, a trade association, led to the first commercial use of this enzyme in the United States. Currently, more than 19 million layer chickens are being fed phytase.

**Table 1: Recommended water flow rates for swine production**

Phase of Production	Volume/30 sec	Quarts/min
Nursery	8 oz (1 cup)	0.5
Grow-Finish	16 oz (1 pint)	1.0
Gestating Sows/Boars	16 oz (1 pint)	1.0
Lactating Sows	16 oz (1 pint)	1.0

#### Pelleting feeds

Pelleting is the process of steam heating meal feed and forcing it through a metal pelleting die. This agglutinates the starches and proteins into a pellet. Pelleted diets can improve daily gain by as much as 7% in growing-finishing pigs. This improved efficiency translates into increased nutrient utilization and reduced feed wastage.

#### Water

Limiting water usage significantly reduces the total volume of manure produced. Producers should monitor water usage through the entire complex as well as local usage through automatic waterers. Strategies to reduce water usage in growing-finishing pigs include the use of hanging waterers and wet feeders. Recommended flow rates for various production stages are presented in Table 1.

#### Anti-nutritional factors

Selection of feed ingredients should be made based on nutrient content, nutrient availability, and the absence of anti-nutritional factors. Components such as phytic acid, trypsin inhibitors, and nonsoluble polysaccharides (fiber) are present in many ingredients. These factors impair the animal's ability to digest and absorb nutrients. Special processing techniques may be used to minimize these undesirable components. For example, the addition of various enzymes to wheat-based diets considerably improves energy digestibility. Improving nutrient quality at the expense of nutrient quantity will improve nutrient retention.

#### Genetic selection in plants and animals

Genetic selection can alter and improve the nutrient content of grains used for animal feeds. Improvements in plant genetics are generally permanent. Currently, plant genetic researchers are seeking to manipulate protein quality and quantity. Increasing total protein, especially in corn, may lead to more efficient diets requiring fewer supplemental amino acids, and perhaps, less nitrogen excretion. Genetics also are being applied to reduce the phytate in corn that would dramatically increase the utilization of phosphorus by monogastric animals. Low-phytate corn hybrids may be commercially available by 2001.

On another front, animals can be selected for even greater efficiency. Swine geneticists may someday produce a pig that is more efficient at capturing feed nutrients of environmental concern. Producers are encouraged to adopt new nutritional and genetic technologies as they become available and cost-effective.

# Chapter 3

## Construction and Emergency Response

### Construction Standards

Proper construction of swine facilities is essential to establish community confidence that pollution will be prevented and the integrity of the local environment will be maintained. State and local regulatory agencies provide standards for the design and construction of swine facilities to ensure minimal environmental impact. Generally, design engineers formulate plans for construction. If the proposed operation is greater than 1000 animal units (1 million pounds), plans should be reviewed by the Department of Environmental Protection (DEP), the National Resource Conservation Service (NRCS), the conservation district, and township engineer before permits are issued. Under the Pennsylvania CAFO strategy, operations over 301 animal units and those that must comply with the Nutrient Management Act must meet NRCS construction standards and plans must be approved by a Pennsylvania-certified professional engineer. We recommend that new construction of farms less than 300 animal units that use liquid manure systems follow the same standards as those from 301 to 1000 animal units.

Serious consideration must be given to construction of the liquid manure storage facility. A list of best management practices for construction and inspection of outside (manure basin) and inside (deep pit) liquid manure storage, shallow concrete liquid manure reception areas, liquid manure drain lines, setback distances, and leak detection systems follows. This document is simply an

overview of a few of the construction standards listed in the *Soil and Water Conservation Pennsylvania Technical Guide* for construction of environmentally safe liquid manure storage facilities. Also, the guide contains a comprehensive list of construction standards.

**Outside manure basins**  
Outside manure basins are usually earthen ponds, often lined with 60-mil plastic, double-welded at the seams. Prior to construction, soil engineering and compaction tests should be performed in accordance with the *Soil and Water Conservation Pennsylvania Technical Guide*. Outdoor manure basins also may be constructed of concrete. All manure storage facilities should be completed to specifications before animal population of the site.

**Under-building deep pits**  
All deep pits for liquid manure should be engineered and constructed according to specifications of the *Soil and Water Conservation Pennsylvania Technical Guide*. Following are some specifications:

- (1) Concrete must be at least 4,000 psi and, unless special precautions are taken, poured at an ambient temperature of between 40 and 90° F. Antifreeze compounds are not permitted.
- (2) Steel reinforcement, of engineered size (usually 1/2 inch), must be included in construction of the footers to ensure stability of the structure.

- (3) Welded number 10 wire must be used to reinforce the poured concrete floor. Wire must be a six-inch-by-six-inch grid and be supported two inches above the base of the pour so that the wire is centered in the concrete.
- (4) Controlled shrinkage joints must be installed every 50 feet and sealed with a rubber-type (sonlastic) sealer, which has the ability to expand and contract while maintaining integrity of the joint.
- (5) Vinyl water stops must be installed around the perimeter of the pit floor and in wall joints between daily pours.
- (6) Curing compound should be applied to inside concrete surfaces.
- (7) A leak detection system should be installed around the outside perimeter of the pit. This typically consists of four-inch perforated drain pipe located at the base of the walls. The pipes generally drain to a common location above grade and away from the building.

Shallow concrete manure reception area

- (1) Shallow concrete manure reception areas, such as those found under most gestation and farrowing barns, should be built to engineered structural specifications. Generally, specifications are identical to those for deep pit construction, with minor differences in the amount and size of reinforcement required in the side walls.
- (2) A leak detection system should be installed around the perimeter of the pit as described in (7) in the prior section.
- (3) Controlled shrinkage joints must be installed every 50 feet and sealed with a rubber-type (sonlastic) sealer, which has the ability to expand and contract while maintaining integrity of the joint.
- (4) Vinyl water stops must be installed around the perimeter of the pit floor and in wall joints between daily pours.

Manure drain lines

Manure drain lines that transport manure from shallow collection areas to long-term storage should be installed to engineered specifications.

- (1) Trenches must be back-filled with crushed stone before installing the drain line.
- (2) Sewer/drain rated (SDR) 35 pipe must be used for lines less than 12 feet below grade. SDR 26 (heavier gauge) pipe is used for lines more than 12 feet below grade.

Setbacks from property lines for manure basins and deep pits

In accordance with the Pennsylvania Nutrient Management Act, basins and deep pits less than 1.5 million gallons must be at least 200 feet from a property line. Basins and deep pits over 1.5 million gallons must be at least 300 feet from a property line. Measurements are to be taken from the toe of outside manure basins.

Leak detection

Leak detection systems are recommended for all manure storage areas, including shallow, short-term storage. Leak detection systems are recommended for newly constructed deep pit and outside manure storage basins. Detection systems should be site specific and satisfy criteria of the *Soil and Water Conservation Pennsylvania Technical Guide*.

Inspection

We recommend that the developer invite NRCS and conservation district personnel to inspect the site during key intervals of construction, including:

- (1) Completion of outside manure basin.
- (2) Completion of the shallow concrete manure reception area.
- (3) Completion of the deep pit.

## Emergency Response

Producers are expected to have an emergency response plan to control environmental damage in the unfortunate event of a liquid manure leak or spill. The plan should include the names and phone numbers of contact people, as well as a detailed plan of action. The plan should be stored on-site near a telephone and reviewed annually by producers, family members, employees, and other individuals named in the plan. Following is a sample emergency response plan. Note that some producers may be able to use these forms as printed. Other operations may require more detailed descriptions, even though the framework of the plan would be similar.

# Environmental Emergency Response Plan

**For:**

(Operation)

---

**By:**

Date:

---

## Environmental Emergency Response Plan

### Description of Swine Facility

1. Owner/Operator:
  
2. Type of swine facility:
  
3. Capacity of facility, AEU:
  
4. Describe activity at facility:
  
5. Describe manure storage facilities: (type, capacity)
  
6. Attach copy of a 7 1/2 minute USGS map  or surveyor's drawing  showing: facility name , facility DEP # , facility location , name of 7 1/2 minute USGS quadrangle , county , property boundaries , location of swine buildings , location of manure storage structure , location of surface drainage courses leading away from site , manure loading area , and leak detection systems .
  
7. Describe a brief history of location.
  
8. Describe existing emergency response plans.
  
9. Describe pollution incidence history for this site.

# Environmental Emergency Response Plan

## Description of How the Plan Will Be Implemented

1. Who will be responsible for implementation of the plan?

2. Describe the duties and responsibilities of the individual(s) within the organization who will implement the plan.

3. List the emergency coordinators:

Primary      Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
State/Zip: \_\_\_\_\_ Tel. No.: \_\_\_\_\_

Secondary      Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
State/Zip: \_\_\_\_\_ Tel. No.: \_\_\_\_\_

Secondary      Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
State/Zip: \_\_\_\_\_ Tel. No.: \_\_\_\_\_

4. Describe how the leak detection system will be monitored.

5. Describe any preventative practices that will be implemented.

### Steps for the Emergency Action Plan

1. Identify specific countermeasures to be undertaken by the operation in the event of a manure release.
2. List the emergency equipment needed to implement the plan. (list contact person, address, and phone no. for each piece of equipment, if applicable).
3. List the steps in your Emergency Action Plan for all possible on-site emergencies.
4. List the steps in your Emergency Action Plan for off-site emergencies.

### **Describe Other Material/Waste in Inventory (Note that the use and storage of these materials are unrelated to manure management. However, they deserve careful handling, inventory control, and emergency preparedness precautions.)**

1. List chemical fertilizers kept in inventory; list quantity, list how material is stored.
2. List disinfectants kept in inventory; list quantity, list how material is stored.
3. List insecticides kept in inventory; list quantity, list how material is stored.
4. List fuels kept on-site. List how fuels are kept.
5. List other chemicals kept in inventory and list the amount.

# Environmental Emergency Response Plan

## Emergency Notification List

### Regional DEP Office:

Contact Person: \_\_\_\_\_

Tel. No.: \_\_\_\_\_

### Local Conservation District:

Contact Person: \_\_\_\_\_

Tel. No.: \_\_\_\_\_

### Local DEP Office:

Contact Person: \_\_\_\_\_

Tel. No.: \_\_\_\_\_

### Township:

Contact Person: \_\_\_\_\_

Tel. No.: \_\_\_\_\_

### Penn State Ag Extension:

Contact Person: \_\_\_\_\_

Tel. No.: \_\_\_\_\_

### Local Emergency Agencies

(9-1-1 may activate all functions in some areas.)

Ambulance: \_\_\_\_\_

Fire and Rescue: \_\_\_\_\_

Police: \_\_\_\_\_

### Downstream Water Users:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

# Chapter 4

## Biosecurity and Herd Health

### Introduction

Delivery of safe and appealing pork products to the consumer begins on the farm. Proper biosecurity and herd health management are keys to reducing on-farm use of animal health products. Reduction in the use of oral antibiotics and injectable treatments will decrease the occurrence of chemical residues and physical defects in pork. Implementation of these practices will boost consumer confidence in today's swine industry and reserve a place for Pennsylvania pork on kitchen tables worldwide.

For example, the National Pork Producer's Council has targeted the elimination of antibiotic residues in a major educational effort aimed at producers and feed manufacturers. The Pork Quality Assurance program (PQA) emphasizes that producers must know and follow guidelines for safe antibiotic use and withdrawal times. USDA slaughter plant monitoring programs have confirmed the effectiveness of these efforts. Since the inception of PQA, chemical residue violations in pork have dropped tenfold.

The best management practices described below focus on the prevention of pork quality problems through biosecurity and herd health management. We strongly recommend that producers discuss these issues with their herd veterinarian and participate in the Level III Pork Quality Assurance (PQA) program sponsored by the National Pork Producer's Council.

### Biosecurity

The goal of biosecurity is to prevent the introduction of disease-causing organisms such as bacteria and viruses into the swine herd. Manure or other organic material attached to clothing, boots, equipment, and animals (such as pets, rodents, birds, and other pigs) all provide suitable vehicles for disease-causing organisms to travel between herds.

Modern biosecurity practices also aim to exclude from the swine herd bacteria that could potentially cause food-borne illness. These bacteria can result in consumer illness if pork is not properly prepared. "Farm-to-fork" food safety programs strive to make meat products safe, regardless of preparation, and serve to boost consumer confidence in pork products.

Thus for the producer, biosecurity means pigs are exposed to fewer pathogens, are healthier, need fewer animal health products, grow faster, and convert feed to pork more efficiently. For the consumer, good biosecurity leads to safer, more affordable pork.

Biosecurity practices address the following aspects of swine husbandry: traffic control, pest control, isolation, age-segregated production, feed manufacturing, transportation, and mortality disposal.

#### Traffic control

People can transport diseases between farms and between groups of pigs on the same farm. To minimize this risk, the following precautions should be observed. Visitors and employees must limit their contact with other pigs and should not enter a swine farm within 48 hours after contact with other swine. Farms require all people (employees or visitors) to shower and change their clothes. Finally, whenever possible, people should move from youngest to oldest and from healthiest to least healthy groups of pigs on the farm.

#### Pest control

Dogs, cats, fur-bearing wild animals, rodents, birds, and other livestock can transmit diseases to pigs. These animals must be excluded from the facility to maintain proper biosecurity.

#### Isolation

An isolation/acclimatization program should be established for incoming replacement breeding stock. Isolation can protect existing animals from potential disease introduction from replacements. Furthermore, the isolation period can acclimate incoming animals to pathogens already present in the facility. Waste management, nutrition, sanitation, pest control, regular herd veterinarian visits, and managing the movement of people, equipment, and animals are equally important to a good isolation program. Note that incoming semen and embryos also can pose a biosecurity risk. Consult your herd veterinarian to develop an effective, farm-specific program.

### Age-segregated production

To minimize the spread of disease from older pigs to younger pigs, growing swine are separated into groups based on age. Age-segregated groups are housed in cleaned, disinfected rooms or buildings with individual ventilation systems. Pig flow through the farm must be coordinated to allow all-in, all-out production, to prevent co-mingling of different age groups, and to ensure adequate cleaning of facilities between groups.

### Feed source and control procedures

Feed and feed ingredients are likely the largest quantity item to continually enter a farm and represent a recurring biosecurity risk. Feed trucks traveling from one hog farm to another can potentially spread disease. Make sure feed suppliers use proper biosecurity procedures between farm deliveries. Feed and feed ingredients must be stored in clean, dry structures designed to minimize exposure to rodents, pets, and wildlife.

### Swine transportation

Transportation procedures should be designed to minimize disease transfer (via manure or other organic matter) between groups of pigs or production facilities. Move pigs only in clean, disinfected transport vehicles. When using outside trucking companies, inspect trucks for cleanliness prior to docking. Truck drivers should not enter production facilities. Transportation equipment and animal-handling facilities should be well constructed, free of sharp or protruding edges, and easily cleaned after use.

### Mortality disposal (See Chapter 6)

Immediately remove dead animals from the facility and dispose of carcasses as required by state law. If carcasses are stored for rendering pickup, the farm should cover or enclose the carcass pickup area. The site should be protected from flies, birds, rodents, and wildlife and be physically separated from the production facility.

## Herd Health Management

While biosecurity measures aim to prevent new disease organisms from entering the herd, herd health management programs ensure that existing pathogens are adequately controlled, and any new diseases entering the herd are rapidly identified. Monitoring for health concerns is a continuous process. Possible ways to track herd health include: regular visits by the herd veterinarian, routine blood testing, postmortem examinations, slaughter checks, and a review of production and financial records. Consult the herd veterinarian to establish a herd health program that is in accordance with potential health concerns and business objectives of the farm.

# Chapter 5

## Monitoring

### Introduction

Monitoring is an important and continual process. Many items discussed in this chapter can be easily checked by the producer during a normal day's work. All pork producers are encouraged to implement the following monitoring practices at the swine facility. Operations may be able to obtain assistance from agricultural organizations and agencies related to formally documenting these monitoring efforts. This chapter outlines the ways that pork producers can monitor key activities to ensure environmental stewardship. Several suggested checklists are provided.

### Monitoring for Environmental Stewardship

Nutrient flux on the farm should be monitored by tracking nutrient inputs and outflows from the operation. Results of manure, soil, tissue, and water tests, along with manure, commercial fertilizer applications, and crop records, can document the successful implementation of the farm's nutrient management plan.

Following the procedure outlined in the *Pennsylvania Agronomy Guide*, the producer should take and analyze manure samples each time the storage is emptied. Manure should be analyzed for total nitrogen, ammonium nitrogen, phosphorus, potassium, and percent dry matter. Because changes in nutrient content occur from top to bottom in a manure storage structure, more than one sample may be needed to accurately characterize manure nutrient content. For at least the first year of operation, the farm should analyze manure for trace elements, including copper and zinc, unless dietary changes demand more frequent laboratory analysis.

Manure application records that include date, location, rate and method of application, incorporation, and soil and weather conditions should be kept. Record application setbacks from wells, streams, and sinkholes. Producers also should record the amount of manure exported to other farms and transported by other farmers. If producers spread exported manure, they should record the date, time, amount, and location of application. Commercial fertilizer applications should also be recorded (including date, location, rate, and method of application), or as required by the Nutrient Management Act.

Soil should be sampled at least every three years or whenever crops are rotated. Soil analysis should include pH, phosphate, potash, copper, and zinc. Test results also should report lime, nitrogen, phosphate, and potash needs for each crop to be planted. Soil compaction tests and a calculation of the phosphorus index value (see appendix) should be considered every three years. The phosphorus index value will help identify fields with high potential for phosphorus runoff. In-season nitrogen tests such as the PSNT or chlorophyll meter test can help fine-tune nitrogen management.

Crop yield records and manure and soil analyses should be maintained.

Monitoring the nutrient content of surface and ground water, in addition to tracking precipitation and water use, helps target potential pollution sources. Have a certified laboratory analyze the water from wells and streams on the farm for nitrates, phosphorus, and bacteria quarterly. Record daily weather conditions, particularly precipitation. Monitor water consumption and total water use in the facility. If using more than one water source, record how much water was used from each.

Miscellaneous records that should be kept include techniques used to control odor generation, including addition of manure additives, manure composting, and manure aeration. Record pesticide applications, rates, and locations in accordance with the Pennsylvania Department of Agriculture's Bureau of Plant Industry. Also record mortality, animal inventory, and operation security measures.

Manure storage structure integrity and manure transport are potential sources of pollution and should be constantly monitored. Observe the integrity of the manure storage structure daily, including the presence of potentially destructive rodents in and around the structure. Check leak detection systems daily for signs of abnormal discharge. If some water discharge is normal, test discharge water each month for nitrogen, phosphorus, and bacteria. Record manure handling activities such as pit flushing, transfers of manure between storage structures, and manure agitation. Record the rate of rise in the manure storage every week. Check manure application equipment including piping, caps, fittings, and valves before, during, and after spreading manure. Repair as necessary.

## Monitoring Checklists

The manager or operator should consider completing checklists to document the monitoring of high-priority activities. Samples of daily, monthly, and annual checklists are provided. Items may be added or deleted for individual operations.

### Daily checklist

- (1) Integrity of manure storage structures for obvious defects.
- (2) Leak detection system for abnormal discharge.
- (3) Proper mortality disposal.
- (4) Farm security systems such as doors, fences, gates, and safety devices.

### Monthly checklist

- (1) Liquid level of manure in storage structures.
- (2) Integrity of manure storage structure including wet spots, bank erosion (for outside earthen structures), and rodent activity.
- (3) Monthly water usage through a water meter.

### Annual checklist

- (1) Validity of nutrient management plan
- (2) Soil, water, and manure tests
- (3) Crop yields

### Manure application checklist

- (1) Irrigation equipment—piping, caps, fittings, nozzles.
- (2) Liquid manure spreading equipment—release valves, fittings.
- (3) Wind speed and direction.
- (4) Manure application log—date, field ID, application rate, application method, incorporation, ground cover.
- (5) Soil and weather conditions.
- (6) Manure spreader calibration.

# Chapter 6

## Mortality Disposal

### Introduction

With any animal enterprise, some mortality is inevitable despite farmer's best efforts. Carcasses from deceased livestock must be disposed of in a manner that does not threaten the environment, pose health risks to either humans or animals, or offend neighbors. Approved methods for carcass disposal in Pennsylvania include rendering service removal, composting, incineration, or burial.

### Rendering Service Removal

The most common method of mortality disposal is through rendering service removal. In many areas, rendering services make regularly scheduled stops to collect dead animals. Carcasses are returned to the rendering plant where they are heat-processed and converted to animal protein products. Special consideration should be made to identify a pick-up area. It should be away from buildings to avoid breaches in biosecurity by rendering trucks and prevent access by scavengers.

### Composting

Composting is gaining in popularity as a method of mortality disposal. Dead animals are layered in a mixture of sawdust and straw under roof in concrete-bottomed bins. Natural bacterial activity converts the animal tissue to an earth-like humus. Midway through the composting process, the compost must be turned and

is usually moved to a secondary bin. Composting time varies with the size of the pigs and management of the compost facility, but large sows can be composted in 60–90 days. Odor, leakage, and fly problems can be avoided in a properly managed compost system. Some guidelines for designing and operating a compost system follow. Contact county extension staff for building designs.

- (1) Construct the composting facility in an inconspicuous place near the back or side of buildings.
- (2) Construct the facility to provide 30 square feet of bin space per 1000 pounds of pigs to be composted annually.
- (3) Compost buildings should be under roof, but have plenty of ventilation. Allow enough ceiling height for loader access when turning compost.
- (4) Flooring of compost bins and access areas should be concrete.
- (5) Divide the compost area equally into primary and secondary bins. Compost is moved from primary to secondary bins during turning about halfway (30–60 days) through the composting process. Secondary bins are often constructed immediately behind the primary bins for ease in material transfer. Primary bins should be sized to fill in one or two weeks, to a minimum height of four feet. Bin sides should be constructed of pressure-treated wood or concrete. Bin doors should be sturdy, yet easily opened for loader access.

### Incineration

Incineration is an option for small pigs but is expensive for market-weight pigs or sows. Commercially built incinerators burn carcasses to ash, normally using propane as fuel. The advantages of incineration include convenience and the absence of biosecurity risk. However, operating costs for incinerators make this system rather costly for larger animals.

### Burial

Burial of dead animals is legal in Pennsylvania, but large operations should strongly consider other options. Burial must be in a place and manner that does not result in contamination of ground water, surface water, or neighboring property. The burial site should not be subjected to overflow from ponds or streams and should be at least 100 feet from any watercourse, well or spring, public highway, or house. The top of the carcass should be covered with lime and should be at least two feet under the surface of the ground.

# Chapter 7

## Community Impact

### Introduction

Any business enterprise has the potential to positively impact the surrounding community. Agricultural operations and, in particular, modern swine operations are no exception. For example, swine enterprises may provide employment opportunities, increase tax revenues, and may help support local businesses. On the other hand, manure production and odor emissions may offend neighbors, and increased truck traffic may contribute to accelerated road deterioration.

Many potential negative impacts associated with a swine unit can be avoided by proper siting (See Chapter 1). Operations located in isolated areas or in localities accustomed to livestock production may raise fewer public concerns. In some areas there may be no acceptable siting solutions for a proposed farm. Furthermore, appropriate facility construction (See Chapter 3), progressive standard operating procedures (See Chapters 2, 4–6), and healthy community interactions (See Chapter 8) will minimize public concerns—both real and perceived. Farmers and communities must work together to realize the potential benefits of a swine farm.

### How Swine Enterprises Directly Benefit Communities

#### Employment

Sow operations provide the most potential for employment. Generally, one employee is needed for every 150 to 200 sows. A 1400-sow enterprise may have about \$120,000 in annual wages and salaries that help contribute to the local economy. Wages paid by swine operations are normally competitive with those of other skilled labor.

#### Tax base

The land on which the swine operation is built will generally be taxed at a higher rate because of the added value of its buildings. Unlike residential developments that demand increased services from the municipality, the swine enterprise does not burden the local infrastructure.

#### Local business support

During the construction phase, local businesses are important for supplying building materials such as concrete and lumber. After the operation is in production, maintaining the facility requires plumbing parts, tools, and other miscellaneous items that will be purchased locally.

#### Soil nutrients

Manure provides nutrients and organic matter for nearby cropland. Farmers utilizing this manure can reduce their expenses for commercial fertilizer, while improving the health of the soil.

Other indirect support comes from having a good neighbor policy (See Chapter 8). Offering the use of equipment or personnel at appropriate times can benefit the community and improve the image of the swine enterprise.

# Local Challenges to Swine Production

## Odors

### Perception of odor

Research has shown that the anticipation of offensive odors is as likely to cause complaints as the odor itself. In a report from the North Carolina State University Swine Odor Task Force, the following conditions seem to affect our perception of odor:

### Control

Neighbors can cope with an objectionable odor more effectively if they feel they can do something about it. When facilities are erected without residents' consent, odors tend to seem more offensive.

### Understanding

People often can tolerate the odor problem more easily if they understand how a swine operation functions.

### Context

Some people may prefer the odors from horses or cows because they associate pigs with filthy conditions. Also, attempting to mask the odor may amplify the perception that odor exists.

### Exposure

Long-term exposure to an odor may decrease our awareness of it. This may explain why swine producers have difficulty understanding why neighbors are upset about odor.

## Factors affecting odor production

The actual sources of odor include the livestock facility, the manure storage area, and the application of manure. The application of manure is considered to be the most intense odor generator, but this activity is usually intermittent. The manure storage area and facility generate odor continuously and can lead to complaints when facilities are large.

Odorous compounds are generated by the decomposition of manure. Pig manure is in an anaerobic state when excreted and remains anaerobic unless oxygen is introduced into the manure storage system. Fresh manure normally has a pH of 6.5–7.0. The pH of manure can be reduced through the addition of muratic acid. Lower pH reduces the release of ammonia and organic acids. However, at a pH of 4 to 5, amino acids are broken down, leading to the release of odorous amines and sulfur compounds. At a high pH, hydrogen sulfide release is minimized, but the release of ammonia and organic acids is enhanced. The generation of most odor components also is increased at higher temperatures.

Odorous gases often associated with dust particles are transported by the wind. Cleanliness inside the facility, which reduces dust emission, can reduce odor outside the facility. The worst climatic condition for odor is low wind speed and a temperature inversion. This allows the odorous compounds to travel in a plume with little concentration change over significant distances. High wind speeds and low humidity increase turbulence that helps to dilute odorous compounds with clean air.

## Impact of odor on local residents

If a producer follows recommended manure-handling guidelines, will there still be odor from the application of manure? Yes, if the manure is surface-applied. However, most residents are tolerant of odor for these short periods of time, especially if they believe the producer is using sound management practices. Furthermore, long-term storage of manure, which is common for large operations, means that the spreading will take place only two or three times a year.

Will there be odor even when manure isn't being spread? There can be. Whether that odor is offensive to neighbors depends upon several factors. The distance between the farm buildings and the nearest residential development is the most important determinant in reducing potential odor complaints. Topography of the locality, prevailing wind during summer months when windows are most likely to be open, and trees and vegetation between the farm and neighbors also are important factors. Finally, the social background of the neighbors plays an important role in how they perceive and react to livestock odors.

Some people, even those who may have relocated from the city to rural areas, do not mind occasional odors that occur in livestock-producing areas. They may regard the smell of manure, hay, or corn silage as less offensive than the noise, exhaust, and congestion that are common in city life. But there are also people who may have a rural background and not be the closest residents to a swine operation, but regard manure odor as offensive, even if the odor occurs only periodically. As a result, some of these people have reported negative feelings ranging from anger and depression to fatigue and nausea. It isn't clear what causes these feelings, but there is evidence that some people also express similar reactions when living in proximity to manufacturing industries that emit objectionable odors.

Are there ways to reduce odor? The most effective means is to maintain as much distance as possible between the livestock operation and residential development. Maintaining a clean environment inside the buildings also is important. When the outside manure storage area appears to be a major contributor to the odor, organic covers such as straw, leaves, or grass clippings are helpful. Other technologies such as feed and manure additives, manure digestion, oxygenation of the slurry, fan scrubbers, and biofilters are the subject of many research studies. At present it is difficult to identify any of these practices that are especially effective or practical. Nonetheless, most producers routinely introduce additives to their manure storage structures in an effort to do everything possible to reduce odor production.

Odor during manure application can be greatly reduced if manure is injected or incorporated immediately after spreading. Manure that is underground also retains more fertilizer value. Wind direction should be monitored at spreading time to reduce odor for those living downwind. When possible, manure should be spread early in the day under low humidity conditions so that it will have a chance to dry quickly.

#### Water usage

Large swine operations may use from 4,000–12,000 gallons of water each day. In most cases, these withdrawal rates will have minimal impact on the local aquifer, but there may be some circumstances that affect nearby wells.

#### Water contamination

If the manure is applied in accordance with an approved nutrient management plan, there should be little, if any, risk of water contamination. Sensible manure disposal includes:

- (1) appropriate application rates.
- (2) setbacks from wells, streams, springs, and other water supplies.
- (3) spreading manure cautiously in higher-risk situations (steep, frozen, cracked ground, or areas with limestone outcropping, or near sinkholes).

#### Truck traffic

Large swine operations may require between one and four 22-ton feed deliveries per week. In addition, usually two to four trucks will be required to move pigs in and out. Manure application generally occurs twice per year. During the manure application period, truck traffic may be much more frequent and last from a few days to a few weeks.

Tractors and trailers with a combined weight up to 80,000 pounds are permitted to travel all state and township roads (unless otherwise limited) within the state of Pennsylvania. Bridges may have weight limits of less than 80,000 pounds imposed by either the state or township. Special permits may be approved by the township and state for tractors and trailers up to 95,000 pounds gross weight. A typical tractor and trailer hauling 190 market weight pigs or 500 feeder pigs will weigh nearly 80,000 pounds. Feed is normally hauled in 40,000–44,000 pound loads, bringing the gross truck weight to about 80,000 pounds.

If public roads must be used by manure trucks, producers should confine manure application to daylight hours and control dust generation from dirt roads. In general, a load of liquid manure weighs less than a load of feed, so the impact on roads will generally be less. Also, the tires on manure spreading equipment are normally balloon type to help buoy the truck on damp fields. These tires also reduce wear and tear on roads.

#### Noise

Noise generation from the pigs in a swine facility is intermittent and should not be an issue for properly sited facilities. There may be some noise when pigs are loaded or unloaded. People moving hogs in to or out of the facility should refrain from shouting. Fans also generate some continuous noise. Under some conditions, high RPM fans, normally used in pit ventilation, may produce objectionable noise.

The most noticeable noise generated from swine facilities is that of trucks going in and out of the facility. Jake brakes should not be used near residential areas. Feed deliveries and pig movements may, by necessity, occur at any time of the day, but manure hauling should be confined to daylight hours.

# Chapter 8

## Good Neighbor Policy

### Introduction

The objective of a good neighbor policy is to actively create goodwill toward and trust within the local community. Large-scale swine production facilities too often operate with little communication with those living nearby. It is the intention of this section to outline ways in which developers can develop not only a hog farm, but also create positive community atmosphere in the surrounding area. This is not simply an effort to patronize the community, but an attempt to communicate the willingness of the owner to be a part of the community and make it a better place for all who reside there. The developer should be proactive in recognizing public concerns and admit that mistakes have sometimes occurred in the swine industry. Developers should be prepared to describe strategies for preventing these mistakes. The remainder of the chapter is not a compilation of items a developer must accomplish. It is to simply provide ideas for enhancing community relations.

### Information Dissemination

The developer should be prepared to explain the construction process and distribute materials detailing information on the developer, the type of farm being planned, construction specifications, and nutrient management plans. The developer also should meet with and inform local officials including township supervisors, county commissioners, soil conservation officers, and extension personnel.

### Farm Appearance and Visitation

Immediately after settlement, there should be a concentrated effort to keep the site clean and orderly. If the existing farm buildings were in disrepair, they should be repaired as soon as possible. During this time, neighbors could be invited to view farm improvement progress. Visitation should not be discouraged, but an appointment policy should be in place for the safety of visitors. Once construction starts, crews should keep the site neat with inventories organized and trash picked up.

The finished site should be attractively landscaped with evergreens and flowers, trash should be picked up, and grass mowed so that the farm is a visual asset to the neighborhood.

Access to the farm should be controlled. Hunting privileges may be granted to immediate neighbors if desired. It may be advisable to restrict the types of firearms allowed. Safety zones should be enforced.

## Nutrient Application

Nutrient application should take place when other farms are applying waste and when the nutrients can best be utilized by crops. When application is planned, consider notifying adjacent neighbors of application schedules. Ask adjacent, downwind neighbors to notify you of planned events such as cookouts, parties, etc., and plan application to avoid these events. Once application has begun, monitor environmental factors such as wind, temperature, and humidity that could increase odor dispersion to certain neighbors. When such conditions exist, be flexible and change application sites until environmental conditions change. When possible, incorporate manure into the ground within 24 hours after application. Avoid applying manure on weekends and holidays. Be sensitive and courteous to neighbors and take all odor complaints seriously. Keep up-to-date records of manure applications and allow neighbors to review them if requested.

## Operational Issues

The farm should be kept neat and clean at all times, both inside and out. Manure storage structures should be fenced, meet all safety standards, and properly posted with warning signs. The farm should utilize any proven odor reduction technology and keep neighbors informed on efforts to control odor. Fly and rodent controls should be used continuously. Any mortality should be stored out of sight and disposed of immediately according to state regulations.

Rely on local businesses to support as many farm activities as possible. Purchase propane gas, repair parts, tools, lumber, and concrete from local suppliers.

## Neighborhood Activities

Consider working with the local community in civic projects and functions. For example, some large operations provide pigs for local 4-H or FFA members to use as projects. Others have plowed snow for neighbors or adopted a section of local highway. The farm should work with local schools on school-to-work, training, and intern programs to promote local swine production. If possible, most employees should be hired locally.

# Appendix: References

National Pork Producer's Council. 1998. NPPC Environmental Assurance Program.

*The Soil and Water Conservation Technical Guide for Pennsylvania.*

National Pork Producer's Council. *Pork Quality Assurance: Levels I, II, & III.* 1997 edition.

McKean, James, Ph.D. Draft copy of *AASP Food Safety—Good Production Practices.* Iowa State University.

Swine Health Committee of the American Association of Swine Practitioners. 1996. *Boar Stud Isolation and Health Guidelines.*

Lemunyon and Gilbert. 1993. The concept and need for a phosphorus assessment tool. *Journal of Production Agriculture*, 6:483–496.

Prepared by Robert E. Mikesell, senior extension associate, and Kenneth Kephart, associate professor of animal science.

Contributing authors: Douglas Goodlander, Pennsylvania State Conservation Commission; Joe Gulick, Dekalb Swine Breeders; Dale Martin, Farmer Boy Systems, Inc.; Tom Parsons, University of Pennsylvania; Bob Ruth, Ruth Family Farms; Al Wenger, Wenger's Feed Mill. Reviewers of the document include: Mary Bender, Pennsylvania Department of Agriculture; Mark Breslin, Hoover Management; Joe Garber, Wenger's Feed Mill; Brent Hershey, Hershey Ag; Leon Hoover, Hoover Management; Jerry Hostetter, Hostetter Management Group; Mike Mullady, Purina Mills, Inc.; John Reininger, Hatfield Quality Meats; Bill Rogers, Brubaker Agronomic Consulting Services; John Wagner, White Oak Mills; John Zerby, Purina Mills, Inc.

We solicited comments from: Natural Resource Conservation Service, the Municipal Planning Association, the Pennsylvania Association of Township Supervisors, the State Conservation Commission, the Pennsylvania Association of Conservation Districts, the Chesapeake Bay Foundation, Pennsylvania's Department of Environmental Protection, the Pennsylvania Department of Agriculture, the Chesapeake Bay Commission, Penn State's Nutrient Management Specialists, the Pennsylvania Pork Producers Council, and the Center for Rural Pennsylvania, Stan Lembeck, Clyde Myers, and other selected county agents.

Penn State College of Agricultural Sciences research, extension, and resident education programs are funded in part by Pennsylvania counties, the Commonwealth of Pennsylvania, and the U. S. Department of Agriculture.

This publication is available from the Publications Distribution Center, The Pennsylvania State University, 112 Agricultural Administration Building, University Park, PA 16802. For information telephone (814) 865-6713.

Where trade names appear, no discrimination is intended, and no endorsement by Penn State Cooperative Extension is implied.

Issued in furtherance of Cooperative Extension Work, Acts of Congress May 8 and June 30, 1914, in cooperation with the U. S. Department of Agriculture and the Pennsylvania Legislature. T. R. Alter, Director of Cooperative Extension, The Pennsylvania State University.

This publication is available in alternative media on request.

The Pennsylvania State University is committed to the policy that all persons shall have equal access to programs, facilities, admission, and employment without regard to personal characteristics not related to ability, performance, or qualifications as determined by University policy or by state or federal authorities. The Pennsylvania State University does not discriminate against any person because of age, ancestry, color, disability or handicap, national origin, race, religious creed, sex, sexual orientation, or veteran status. Direct all inquiries regarding the nondiscrimination policy to the Affirmative Action Director, The Pennsylvania State University, 201 Willard Building, University Park, PA 16802-2801; Tel. (814) 865-4700/V, (814) 863-1150/TTY.

© The Pennsylvania State University 1999