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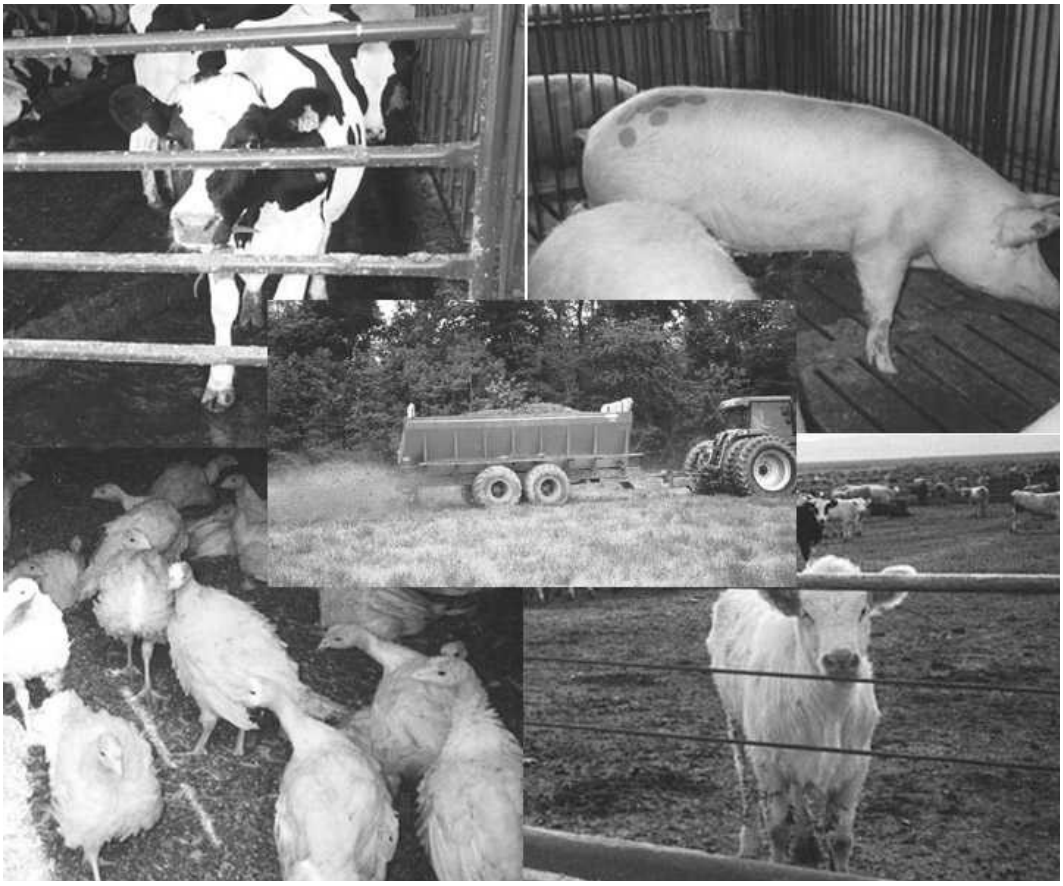
EPA Cost Methodology Report for Swine and Poultry Sectors



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1.0 OVERVIEW OF COST METHODOLOGY

The Clean Water Act authorizes the United States Environmental Protection Agency (EPA) to develop technology-based effluent limitations guidelines and standards (ELGs) for the control of pollutant discharges from point source categories. Certain animal feeding operations (AFOs) are defined as point sources. The existing ELG for the Feedlots Point Source Category (40 CFR Part 412) covers these point sources. Section 301(d) of the Clean Water Act directs EPA to periodically review existing ELGs and revise them when necessary. As part of the EPA-U.S. Department of Agriculture (USDA) national unified strategy to minimize the water quality and public health impacts of AFOs, EPA is reviewing the Feedlots ELG and expects to revise the existing effluent guidelines covering AFOs. This overview addresses the methodology for estimating potential compliance costs for the swine and poultry (turkey, laying hen, and broiler) sectors of AFOs.

The initial steps in the process of estimating potential compliance costs for the swine and poultry sectors include gathering and analyzing data on swine and poultry AFOs to establish a baseline picture. The baseline includes the amount of manure and wastewater produced, the pollution control and management practices in place, current land application practices, and current state requirements. Based on these data, EPA identifies possible new regulatory requirements that may be imposed through revision of the ELGs. These new requirements are typically grouped into several possible regulatory options. These regulatory options sometimes specify a limit on process wastewater discharges (e.g., zero discharge) and might also require specific best management practices, or BMPs (e.g., development of a nutrient management plan).

For each regulatory option considered, EPA analyzes the technical and economic feasibility for the industry. To complete the economic analysis, EPA estimates the costs to install, operate, and maintain specific techniques and practices that serve as the basis for the effluent limitations and standards in each regulatory option. EPA traditionally develops either *facility-specific* or *model facility* costs. It must be noted that the Clean Water Act and the proposed regulations require only that effluent limitations and standards be achieved. These proposed regulations do not require that facilities install any specific technologies.

EPA first collects detailed process information and data about many, if not all, facilities in the industry in order to estimate facility-specific costs if appropriate. EPA has authority to collect information necessary to develop regulations. EPA then may use this site-specific information to determine how the potential regulatory options will affect facilities in an industrial category and to estimate the costs of compliance.

When facility-specific data are not available for all facilities, EPA develops model facilities based on available data to provide a reasonable representation of the industry. Model facilities reflect the different characteristics found in the industry, such as the size or capacity of an operation, type of operation, geographic location, mode of operation, and type of waste management options. Data from engineering site visits, information provided by the industry, and other available information forms the basis of these models. EPA estimates the number of

facilities represented by each model, assesses cost and financial impacts for each model facility, and calculates industry-level costs by multiplying model facility costs by the number of facilities represented by each particular model.

Given the type of information that is available for the swine and poultry industries, as well as the large number of facilities in the industries, EPA has chosen a model facility approach to estimate compliance costs. Such an approach is consistent with the USDA representative farm approach. EPA's cost methodology is summarized in Chapter 11 of the Development Document.

2.0 DATA SOURCES

EPA collected data from a number of sources, including more than 50 site visits to swine and poultry facilities [Docket W-00-27, section 5], industry trade associations (e.g., the National Pork Producers Council, United Egg Producers and United Egg Association, National Turkey Federation, and National Chicken Council), environmental groups (Clean Water Network and Natural Resources Defense Council), USDA-Natural Resource Conservation Service (NRCS), Economic Research Service (ERS), National Agricultural Statistics Service (NASS), Animal and Plant Inspection Service (APHIS), universities, state cooperatives and Extension Services, and the literature. These various sources have been used to compile information that presents a detailed profile of the industry and can be used to estimate the costs associated with potential new pollution control requirements for swine and poultry AFOs. Several data sources that were particularly useful include National Animal Health Monitoring Systems (NAHMS) surveys, the 1997 Census of Agriculture, and USDA's analysis of the Census. These data sources are briefly described below. EPA's range of data collection activities are described in detail in Chapter 3 of the Development Document.

One of the main responsibilities of USDA's APHIS is to enhance the care of animals. APHIS initiated the NAHMS as a program to collect, analyze, and disseminate information on animal health, management, and productivity. NAHMS conducts national studies to gather data and generate descriptive statistics and information from data collected by other industry sources. EPA gathered information from several NAHMS reports such as the Swine '95 and Layer '99 reports. EPA also requested additional analysis of the data presented in these reports that would help EPA better characterize swine and poultry operations by region and farm size.

USDA's Census of Agriculture is a complete accounting of United States agricultural production and is the only source of uniform, comprehensive agricultural data for every county in the nation. The most recent Census reflects calendar year 1997 conditions. USDA periodically publishes aggregated data from these databases and also compiles customized analyses of the data to members of the public and other government agencies. In providing such analyses, USDA maintains a sufficient level of aggregation to ensure the confidentiality of any individual operation's activities or holdings. These data were used to identify the total number of animal feeding operations (AFO) and their general geographical distributions. USDA also compiles and performs analysis on Census data that EPA used for its analyses. These analyses indicate the amount of cropland available to land apply animal manure, the potential for nitrogen and

phosphorus excesses relative to crop needs, and the potential for geographical areas to have nutrient excesses relative to all cropland in the area.

3.0 ESTIMATED COUNTS OF IMPACTED FACILITIES AND CORRESPONDING ANIMAL COUNTS

National estimates of the number of swine and poultry AFOs in 1997 are shown in Table 3-1. Animal sectors were determined based upon the methodology described in Appendix A. To generate these farm count estimates, summary statistics were computed and forwarded to EPA by NASS. Due to NASS non-disclosure practices for analysis of the 1997 Census of Agriculture data, it was necessary for EPA to adjust the desired size classes and regions to develop tables that could be published by NASS and used in future analysis. In some cases only national results could be developed. The results of this iterative process are presented in Table 3-1. Not every facility presented in Table 3-1 is an AFO, and even fewer are subject to the revised regulations. However the cost models were developed assuming all swine and poultry farms greater than 300 AU are potentially impacted by the proposed revisions. One alternative in the proposed regulation would consider middle tier AFOs (300-1,000 AU) to be CAFOs if more than 12 tons of manure is transported off-site to a single recipient annually, unless the recipient certifies that the manure will be properly managed. This condition is not explicitly addressed in the cost model since it is assumed that middle tier AFOs will take such appropriate action as needed to avoid CAFO designation.

Farm counts in Table 3-1 are summarized by the number of animal units (AU) in inventory at the farm. Table 3-2 compares the number of animals that would constitute 1,000 AU for five different animal types, based on two frequently used agency definitions. Note that most animal unit definitions use a 1,000 lb beef cow as the standard reference, but for other animal sectors the definition is not consistent, and it is important to distinguish between the different AU definitions in common use. EPA defines animal units in 40 CFR Part 122 Appendix B. This is the animal unit definition used by EPA when developing costs. USDA defines animal units on a liveweight basis, which is cited in most NRCS publications referenced in this document. Additional information may be found in Chapter 4 of the Development Document and in the Record.

Table 3-1. Summary of Swine and Poultry Farms by Size Class

Sector Modeled	Size Class (AU = EPA Animal Units)			
	<300AU	300-1000 AU	>1000 AU	All Model Farms
Swine: Mature	103,512	10,191	4,092	117,795
Swine: Nursery	0	83	0	83
Layer: Wet	1,950	800	360	3,110
Layer: Dry	70,368	1,334	360	72,062
Broiler	20,716	10,203	3,940	34,859
Turkey	11,617	1,732	369	13,718
Source: Swine and poultry counts from analysis of 1997 Census of Agriculture tabulated by NASS.				

Table 3-2. Comparison of EPA and USDA Definitions of Number of Animals in 1,000 Animal Units

Animal Type	Animal Unit (EPA definition)	Animal Unit (USDA definition)
Beef cow	1,000	1,000
Dairy cow	750	740
Swine	2,500	9,090
Layer (wet)	30,000	250,000
Layer (dry)	100,000	250,000
Broiler	100,000	455,000
Turkey	55,000	67,000

4.0 SUMMARY OF DEVELOPMENT OF MODEL FARMS/COST MODEL

EPA developed model farms to describe the types of swine and poultry operations that will incur compliance cost for various regulatory options under consideration. Chapter 11 of the Technical Development Document provides a summary of this process. This section provides additional details.

4.1 Development of Model Farms

EPA developed base models that capture those characteristics that usually vary from farm to farm. The base model is described by the following:

Animal type - Swine, layers, broilers, and turkeys.

Subsector - The subsectors considered for swine are slaughter (grow-finish and wean-finish operations), breeding, farrow to wean (farrowing), and farrow-to-finish (both swine for slaughter and sows). The subsectors considered for chickens are layers only, pullets only, both layers and pullets, hatcheries, breeders, and broilers. The subsectors considered for turkeys are slaughter (grow-out), breeders, and both breeders and grow-out.

Breeding operations are generally smaller than both EPA thresholds of 300 and 1,000 animal units, thus they are not subject to effluent limitations guidelines and standards (ELG). Further discussion with industry indicated many breeding farms, especially turkey and swine breeders, are sited away from other facilities. This helps these facilities to minimize losses that might occur due to a breach in biosecurity. On the basis of smaller farm size and typically separate siting, the breeders and hatcheries subsectors were not analyzed further.

In addition to breeding operations, sometimes immature swine (termed feeder pigs or weaners) are also housed at separate locations. Analysis of 1997 census data indicated no pig nurseries larger than 2500 head were independently sited. Subsequent conversations with industry and EPA regions indicated increases in current and planned construction of new pig nurseries. In the absence of information necessary to develop a separate nursery model to represent newly constructed nurseries, nurseries were included in the facility counts of swine: farrow-to-finish.

Pullets are housed in cages similar to layers, or on bedded floors such as broilers and turkeys. Therefore no separate model was developed for pullets. Though there are many pullet farms located apart from the laying farms or broiler breeder farms, the production and manure management at these operations is very similar to broiler and caged layer operations. Therefore no separate model was developed for pullet farms.

Industry communications and site visits indicated turkey breeders and turkeys for grow-out are not located on the same farm. As with chickens and swine, breeding farms are generally smaller farms (Mauplin; Frankelton, 1999). Therefore EPA decided to conservatively model all turkey farms as grow-out farms.

The subsectors for which cost models were ultimately developed are swine finishing, swine farrow-to-finish, layers, broilers, and turkeys. The farrow-to-finish model accounts for costs to nursery and farrowing operations, and the layer model accounts for costs to pullet only operations.

Manure Handling Method

All broiler and turkey operations were assumed to use litter based houses. Layer facilities were modeled as employing either high-rise houses (“dry”) or flush to lagoon systems (“wet”). The use of wet systems was assumed to be predominantly in the south, and usually for older and smaller laying hen operations (United Egg Producers, 1999, and USDA APHIS, 1999).

A 1995 survey of swine operations shows that both lagoons and deep pits are commonly used for waste storage in the Midwest region (USDA APHIS, 1996). However, other than a general

increase in the use of deep pits in the northern areas, the extent of the use for each system could not determined. EPA intended to model the Mid Atlantic region as having lagoons, and the Midwest region as having under house pits. However, the retrofits required for lagoon systems are more expensive than those for deep pit systems. Therefore, EPA decided to assume that all facilities use lagoon systems to avoid undercosting retrofit requirements. This is also consistent with the concept that the Midwest region model represents the Midwest region plus a portion of all other regions except the Mid Atlantic region. In other words, the Midwest region model reflects parts of the South, Central, and Pacific regions, because census data could not be obtained for all desired regions and size groups (USDA NASS, 1999). A discussion of other housing and manure management systems and their frequency of use is described in the Development Document.

Region - The regions include the South, Mid-Atlantic, Midwest, West, and Central, as defined in the profiles. Originally, ten regions were developed by the Economic Research Service of USDA (ERS) for use in grouping economic information. These regions were condensed into the following five AFO regions because of similarities in animal production and manure handling techniques. States included in each of the five AFO regions include: Pacific (CA, WA, OR, AK, HI); Central (MT, WY, ID, CO, UT, NV, AZ, NM, TX, OK); Midwest (IA, IL, IN, KS, MI, MN, MO, ND, NE, OH, SD, WI); South (AL, AR, FL, GA, LA, MS, SC); and Mid-Atlantic (CT, DE, KY, MA, MD, ME, NC, NH, NJ, NY, PA, RI, TN, VA, VT, WV).

Because the various animal sectors tend to be concentrated in particular geographical regions, data are lacking for those regions where a particular sector has a lesser presence. EPA developed "key" regions to focus cost modeling efforts on those areas in which the various animal sectors are concentrated. The key regions chosen for swine operations are the Mid-Atlantic and Midwest; 78 percent of U.S. hog operations are located in those two regions. To account for all potentially regulated operations in the cost model, those operations in regions other than the key regions were distributed evenly among the two key regions that were modeled. For example, the Midwest region is actually a combination of operations from the Midwest with a portion of the operations from the "non-key" Pacific, Central, and South regions that are assumed to have similar production and manure management practices. Similarly, the Mid-Atlantic region includes operations from the Mid-Atlantic, as well as a portion of the operations from the Pacific, Central, and South regions.

The key regions for broilers are the Mid-Atlantic and South (86% of larger farms), while the Mid-Atlantic and Midwest are the key regions for turkeys (67 % of larger farms). Layer farms with wet manure systems are located primarily in the South and Texas, where approximately half of all layer farms use wet manure handling systems. Industry reports and NAHMS data were used to estimate the number of layer farms with wet manure systems in the rest of the U.S. (USDA APHIS, 1999). The South and Midwest are the key regions for all other layer farms, capturing 53% of larger layer farms in addition to the 12% layers with wet manure systems. Operations from "non-key" regions were folded into the key regions for these animal types in the same manner as described above for swine operations.

The key region determines the amount of precipitation that will need to be managed and the typical evaporation rate. The region also defines typical crop yields, soil types, housing types, and manure management practices that vary across the nation. In practice, a given state may have many soil types and climatic variations; this approach was adopted to account for typical geographical variations without producing an impractical number of model farms.

Size class - Size class refers to the capacity or maximum inventory of the facility. Only swine weighing more than 55 pounds (including sows and finishing pigs) are counted for purposes of size classification of the farm, but all manure generated by animals on the farm is considered and included in the costs estimated for proper utilization or disposal rationale of manure. All turkeys and chickens regardless of age are counted as part of the respective facility.

The size class is a combination of (1) animals in inventory and (2) total sales divided by the number of turnovers/life cycles/herds/flocks produced per year. This is because the Census of Agriculture animal counts do not represent an average inventory of livestock, but instead reflect the inventory on December 31st of the census year. For this analysis, the average livestock numbers were derived from a combination of sales over the year and end-of-year inventory (if both numbers were available), or from either sales or inventory if only one value was available. This allowed for estimates on farms that raise livestock sporadically during the year but have no inventory on December 31st, or farms that ceased production during the census year. Sales data were divided by the average number of turnovers typical operations are expected to have over an entire year, thus operations that ceased production may be counted as having a smaller capacity than they actually had.

The swine sector models include slaughter (finishing operations) and farrow-to-finish (including all farms with breeding or farrowing) operations. The variables identified in Table 4-1 are used together with the algorithms in Figure 4-1 to compute the number of animal units (liveweight basis) at a swine facility. The classification of swine operations is based on the percent (i.e. ratio) of animal units on the operation that are of a given type (swine for slaughter, hogs for breeding, or feeder pigs). Figure 4-1 also presents the equations used to classify swine operations as finishing, farrowing, or farrow-to-finish operations.

Table 4-1. Selected Census of Agriculture Variables for Swine

Questionnaire Brief Description		Census Variable Symbol	
		Inventory (Number on this place 12/31/1997)	Number Sold (in 1997)
Section 14: Hogs or Pigs			
1	Hogs and pigs	K815	
1.a	Hogs and pigs for breeding	K816	
1.b	Other hogs and pigs	K817	
3	Hogs and pigs sold		K820
3.a	Feeder pigs		K822

Animal Unit Calculations

Hogs for Breeding (assume 2.67 sows per animal unit, 365 days on feed)

K816/2.67

Hogs on Feed[a] (assume 9.09 hogs per animal unit, 180 days on feed, 2.8 cycles per year)

K817/9.09	for K817 > 0 and (K820 - K822) = 0
(K820 - K822)/(2.8 * 9.09)	for K817 = 0 and (K820 - K822) > 0
(K817 + (K820 - K822)/2.8)/(2 * 9.09)	for K817 > 0 and (K820 - K822) > 0

Subsector Classification (based on animal units)

Hog Inventory = **Hogs for Breeding** + **Hogs on Feed**

Swine/Finishing Operations: If Hogs for Breeding is less than 5 percent of Hog Inventory and Hogs for Breeding is less than 25.

Swine/Farrowing Operations: If Hogs on Feed is less than 5 percent of Hog Inventory and Hogs on Feed is less than 25.

Swine/Farrow-to-Finish Operations: Operations not classified as Swine/Finishing Operations or as Swine/Farrowing Operations.

[a]The number of cycles per year for Hogs on Feed represents the field frm the Ag Census database developed by EPA for this analysis.

Figure 4-1. Animal Unit Calculations and Subsector Classification for Swine

The chicken sector includes broilers and layers (broilers, layers, pullets, and layer/pullets). The variables identified in Table 4-2 are used together with the algorithms in Figure 4-2 to compute the number of animal units (liveweight basis). Figure 4-2 also presents the equations and logic used to classify operations where more than 75 percent of the animal units (liveweight basis) on the operation are layers or pullets into layer, pullet, or layer/pullet operations. Operations where

more than 75 percent of the animal units on the operation are broilers are classified as broiler operations.

The turkey sector includes subsectors for slaughter (grow out), breeder, and integrated (breeders/grow out) operations. The variables identified in Table 4-3 are used together with the algorithms in Figure 4-3 to compute the number of animal units. Figure 4-3 also presents the equations and logic used to classify operations where more than 75 percent of the animal units on the operation are turkeys into grow out, breeder, or integrated operations.

In addition to operation size, EPA needed to determine which AFOs meet the confinement component of the CAFO definition. Though some smaller chicken and turkey operations may use range or pasture, EPA conservatively assumed all poultry operations represented by the costs models were confinement operations. EPA used NAHMS Swine '95 data to estimate the percent of swine operations that were pasture operations, and to distinguish which swine confinement operations maintained open lots or outside animal access. Generally, the larger swine operations represented by EPA's cost models may be considered to use total confinement housing; EPA believes there are very few swine open lots and pastured operations in the size range of the cost models. For more information refer to *Chapter 4: Profiles* in the Development Document.

Turnovers

EPA needed to determine which animal feeding operations could potentially be defined as CAFOs based on operation size. EPA generally estimated the size of an animal feeding operation by counting the average number of animals in inventory. In many cases where animals are sold intermittently throughout the year, the number of animals sold in a year were converted to the number of animals likely to be in inventory at any given time by dividing sales by the number of turnovers, groups, or flocks of animals or birds produced in a year. USDA identified turnover values that were likely to represent the average operation turnover. EPA supplemented this information with data obtained from NAHMS and industry trade organizations to obtain the turnovers used in the cost models. EPA determined these turnovers were more likely to depict production at the larger operations represented by the cost models.

EPA realized the use of different turnover values could alter the size classification of feeding operations. EPA choose to evaluate the effects of fluctuating turnovers for the turkey sector because the turkey industry experiences a wider range of turnovers than in other animal sectors. For example, a facility may produce just two groups of toms each year, or up to 5 flocks of hens in a partitioned poultry house. EPA found most animal feeding operations maintained enough animals such that changes in turnovers resulted in very small changes in the number of operations classified as AFOs or CAFOs. Data supporting EPA's calculation of turnovers may be found in *Chapter 4: Profiles* in the Development Document.

Manure, litter, and waste generation - Oftentimes manure is not handled or stored as a concentrated manure solid. EPA defined a "dilution factor" to account for the concentration of manure nutrients in manure as stored. This factor includes the volume of manure generated,

water use (flush water, process water, wash water, and precipitation), bedding use, and nutrient generation by all confined animals at the facility. See Section 5.9 for more information on how dilution factors are used in the cost models. Section 4.2 describes EPA's approach to determining manure excesses that ultimately need to be hauled or disposed of. Section 4.2.1 describes the method for determination of manure generation and nutrient content of manure and litter. Other waste generation may include wasted feed, spilled drinking water, and animal mortalities.

Acres - Total acres available on the farm to receive manure. The model reduces total available acres to account for stream bank buffers and setbacks.

Table 4-4 shows the key regions and size class definitions for swine and poultry operations.

Animal Unit Calculations

Layers/Hens (assume 250 layers per animal unit, 365 days on feed)

K892/250	for K892 > 0 and K893 = 0
K893/250	for K892 = 0 and K893 > 0
(K892 + K893)/(2 * 250)	for K892 > 0 and K893 > 0

Layers/Pullets (assume 455 pullets under 3 months old per animal unit/250 pullets over 3 months old per animal unit [or 404 pullets per animal unit], 120 days on feed, 2 cycles per year)

(K894/250 + K896/455 + K895/(2 * 404))/2	for K894 > 0 and K896 > 0 and K895 > 0
K894/250 + K896/455	for (K894 > 0 or K896 > 0) and K895 = 0
(K896/455 + K895/(2 * 404))/2	for K894 = 0 and K896 > 0 and K895 > 0
(K894/250 + K895/(2 * 404))/2	for K894 > 0 and K896 = 0 and K895 > 0
K895/(2 * 404)	for K894 = 0 and K896 = 0 and K895 > 0

Broilers[a] (assume 455 broilers per animal unit, 60 days on feed, 5.5 cycles per year)

K898/455	for K898 > 0 and K899 = 0
K899/(5.5 * 455)	for K898 = 0 and K899 > 0
(K898 + K899/5.5)/(2 * 455)	for K898 > 0 and K899 > 0

Subsector Classification (based on animal units)

Layer Inventory = **Layers/Hens** + **Layers/Pullets**

Chicken/Layer Operations: If Layers/Hens is greater than 95 percent of Layer Inventory and Layers/Pullets is less than 25.

Chicken/Pullet Operations: If Layers/Hens is less than 5 percent of Layer Inventory and Layers/Hens is less than 25.

Chicken/Layer/Pullet Operations: Operations not classified as Chicken/Layer Operations and not classified as Chicken/Pullet Operations.

[a]The number of cycles per year for Broilers was developed by EPA for this analysis.

Figure 4-2. Animal Unit Calculations and Subsector Classification for Chickens

Table 4-2. Selected Census of Agriculture Variables for Chickens

Questionnaire Brief Description		Census Variable Symbol	
		Inventory (Number on this place 12/31/1997)	Number Sold (in 1997)
Section 16: Poultry			
1	Layers	K892	K893
2	Pullets		K895
2.a	Pullets (13-19 weeks)	K894	
2.b	Pullets (<13 weeks)	K896	
3	Broilers	K898	K899

Animal Unit Calculations

Turkeys/Breeding (assume 50 hens per animal unit, continuous replacement, 1 cycle per year)

K902/50	for K902 > 0 and K903 = 0
K903/50	for K902 = 0 and K903 > 0
(K902 + K903)/(2 * 50)	for K902 > 0 and K903 > 0

Turkeys/Slaughter (assume 67 turkeys per animal unit, 180 days on feed, 3 cycles per year)

K900/67	for K900 > 0 and K901 = 0
K901/(3 * 67)	for K900 = 0 and K901 > 0
(K900 + K901/3)/(2 * 67)	for K900 > 0 and K901 > 0

Subsector Classification (based on animal units)

Turkey Inventory = **Turkeys/Breeding** + **Turkeys/Slaughter**

Turkey/Grow Out Operations: If Turkeys/Slaughter is greater than 95 percent of Turkey Inventory and Turkey/Breeding is less than 25.

Turkey/Breeder Operations: If Turkeys/Slaughter is less than 5 percent of Turkey Inventory and Turkey/Slaughter is less than 25.

Turkey/Integrated Operations: Operations not classified as Turkey/Grow Out Operations or as Turkey/Breeding Operations.

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[a]The number of cycles per year for Turkeys/Slaughter was developed by EPA for this analysis.

Figure 4-3. Animal Unit Calculations and Subsector Classification for Turkeys

Table 4-3. Selected Census of Agriculture Variables for Turkeys

Questionnaire Brief Description	Census Variable Symbol	
	Inventory (Number on this place 12/31/1997)	Number Sold (in 1997)
Section 16: Poultry		
4.a Turkeys/Slaughter	K900	K901
4.b Turkeys/Hens	K902	K903

Table 4-4. Economics Model Matrix: Definition of Size Groups and Key Regions

Sector Modeled	Key Regions [a]	Small (# head)	Medium1 (# head)	Medium2 (# head)	Large1 (# head)	Large2 (# head)
Swine: FF	MA, MW	<750	750-1875	1875-2500	2500-5000	>5,000
Swine: GF	MA, MW	<750	750-1875	1875-2500	2500-5000	>5,000
Layer: Wet	SO	<9,000	XXX	9,000-30,000	> 30,000	XXX
Layer: Dry	MW, SO	<30,000	30,000-62,500	62,500-180,000	180,000-600,000	>600,000
Broiler	MA, SO	<30,000	30,000-60,000	60,000-90,000	90,000-180,000	>180,000
Turkey	MA, MW	<16,500	16,500-38,500	38,500-55,000	>55,000	XXX

[a] Region descriptions:
1) Midwest (MW) - production as typical in the primary producing region of Midwest; actually is a combination of Midwest and a portion of Central, Pacific, and South for turkeys and swine. For dry layers, MW is a combination of Midwest with a portion of Central, Mid-Atlantic, and Pacific.
2) Mid-Atlantic (MA) - production as typical in the primary producing region of Mid-Atlantic; farm counts are actually a combination of MA with a portion of Central, Pacific, and South for turkeys and swine. For broilers, MA is a combination of MA with a portion of Central, Midwest, and Pacific.
3) South (SO) - production as typical in the primary producing region of South; farm counts are actually a combination of SO with a portion of Central, Mid-Atlantic, and Pacific for dry layers; a combination of SO with a portion of Central, Midwest, and Pacific for broilers; and SO with all other regions for wet layers.

4.2 Land Availability Methodology

The purpose of the methodology is to classify animal operations within each subsector, region, and operation class by one of three land availability categories. For purposes of the cost model, each operation was categorized by whether the operation had sufficient land to apply the generated animal waste using agronomic rates. The agronomic rates are based on census year crop yields for all farms in the same county. Farms are then labeled as either:

Category 1 - farms with sufficient crop or pasture land

Category 2 - farms with some land, but not enough land to assimilate all manure nutrients

Category 3 - farms with none of the 24 major crop types identified by NRCS

Since the category 3 farms may have crop types other than the 24 major crop types identified by NRCS, and since the analysis does not account for manure that may be used or sold for alternative uses, the approach is expected to provide an upper bound estimate of farms with insufficient crop land to assimilate all manure nutrients. The number of category 1 and category 2 farms will also vary when changing from a nitrogen based application rate to a phosphorus based application rate. Nitrogen-based and phosphorus-based nutrient management have different costs, some of which may be significantly different, such as hauling costs for off-farm (or out-of-county) manure use or disposal.

The base methodology for determining land availability is generally derived from *Nutrients Available from Livestock Manure Relative to Crop Growth Requirements* (USDA NRCS, 1998). The method and analysis were revised in *Manure Nutrients Relative to the Capacity of Cropland and Pastureland to Assimilate Nutrients* (Kellogg et al., 2000). The latter was used to estimate the number of farms in each of the three categories described above, the results of which are presented in Table 4-8.

4.2.1 Computation of Nitrogen and Phosphorus Generation

The amount of nitrogen and phosphorus generated for each operation is estimated based on the number and types of animals on the operation. Because different animal sectors might compete for the same land to apply animal waste off-farm, it is necessary to include all major animal operations (swine, beef, poultry, dairy) in the analysis.

A procedure for the calculation of on-farm nutrient production was outlined in a report by USDA NRCS (1998). Total nutrient availability was estimated for each livestock type by first multiplying the average confined livestock population (in animal units) by the number of tons of manure produced (i.e. manure as-excreted) by each type of livestock, and then multiplying by the recovery factor. The recovery factor reflects that portion of manure that can be collected from the confinement areas and land applied. The recovery factor considers not all nutrients may be recovered and reflects typical nutrient losses due to volatilization, nutrients taken up by plants in grazing areas, accumulation in confinement area soils, feedlot runoff, or leaching into groundwater. This result, tons of recoverable manure, was multiplied by the number of pounds of nitrogen or phosphorus contained in one ton of manure to compute the total pounds of recoverable nutrients. The resulting value was further adjusted for typical nutrient losses that occur during storage and handling to generate an estimate of total available nitrogen and phosphorus from confined livestock manure. Details of manure and animal characteristics are given in Table 4-5 for swine and poultry.

Regional Recovery Factors

EPA used regional recovery factors proposed by USDA. USDA obtained recovery factors for each state to develop the regional recovery factors shown in Table 4-6. The regional factor was calculated by weighting the state recovery factor with the number of animals of each type in a

given state. Table 4-7 gives an example for the calculation of weighting factors. In Table 4-7, the number of broilers (NB) is multiplied by the state recovery factor (RF) to produce the weighting factor. The weighting factor (RF x NB) is summed and divided by the total number of broilers in a region to obtain the regional recovery factor.

Nutrient Losses

The values for nitrogen and phosphorus content after losses were estimated to provide the amount of nutrients that would be present in land applied manure and effluent. There is no "national" or even regional perspective on what these values should be. These estimates are based on a three part
assumption:

- Nitrogen losses will exceed (greatly exceed) those of phosphorus primarily due to volatilization of nitrogen compounds
- As the quality (from an automation view) and numbers of manure management systems improve, the losses of nutrients, particularly nitrogen, may increase. In other words, as the manure management system becomes more automated, nitrogen losses through volatilization also increase.
- Phosphorus amounts are present within the bottom sludge of lagoons and ponds, and even though the sludge is not removed on a regular basis, the phosphorus content must be considered in an application strategy. In other words, effluent composition may not reflect actual nitrogen and phosphorus contents in the lagoon or holding pond.

Numerous individuals from USDA, universities, and industry groups were consulted to arrive at the "national" values for nutrient content after losses. The discussions focused on the types of manure systems typically used by the industry in different parts of the country, the losses typically associated with these systems (see Chapter 11, *Agricultural Waste Management Field Handbook*, USDA, 1992), and the portion of the nation's livestock raised in different parts of the country.

4.2.2 Plant Nutrient Requirements

Extension personnel from counties with the most dense populations of animals were consulted to determine the common cropping practices for the all regions and sectors (refer to Appendix B for details). County Extension personnel identified the typical crop rotation for each sector, and crop yields were determined by dividing the harvested quantity by the acreage obtained in the 1997 *Census of Agriculture* (USDA NASS, 1999a). Occasionally, yields were far below expected yields and were changed to reflect expected yields found in the *Agricultural Waste Management Field Handbook* (USDA, 1992). Crop nutrient removal was based on the nutrient content values for major crops in Appendix I, Table A-1 from USDA NRCS (1998). Nitrogen application rates were increased to reflect the 30 percent loss of nitrogen due to volatilization of ammonia after land application of manure (Sutton et al., 1985). The average annual nitrogen and phosphorus crop removal and application rates were calculated by dividing the sum of crop requirements for a complete crop rotation by the number of years per rotation.

Table 4-5. Manure Characteristics Used to Calculate Nutrient Production

Animal	Operation	Animal Turnover	Average Animal Weight	Animal Unit Conversion	Manure Production	Nutrient Content	
						N	P
		#	lb	#animals/AU (USDA AU)	tons/AU/yr (USDA AU)	lb/ton of manure	
Swine	Integrated	2.1	110.0	9.09	14.69	2.82	2.80
Swine	Slaughter	2.5	135.0	7.41	11.97	2.82	2.80
Chicken	Broiler	5.5	2.5	400	14.97	16.10	6.61
Chicken	Layer	1.0	3.7	270	11.45	18.46	8.50
Chicken	Pullet	2.0	2.0	500	8.32	13.60	8.95
Chicken	Integrated Layer	1.0	3.7	270	11.45	16.10	6.61
Turkey		3	11.3	88.5	8.96	12.40	10.60

Source: USDA NRCS, 1998.

Table 4-6. Regional Recovery Factors for Manure

Region	Recoverable Manure Correction Factor		
	Swine	Chicken	Turkey
	percent		
Central	0.75	0.95	0.75
Mid Atlantic	0.87	0.97	0.97
Midwest	0.76	0.94	0.62
Pacific	0.76	0.90	0.94
Southern	0.54	0.96	0.72

Table 4-7. Example of Weighted Averaging Method for Manure Recovery Factor

State	Number of Broilers (NB)[a]	Recovery Factor (RF)[b]	RF x NB
Alabama	134,027,304	0.98	131,346,758
Arkansas	172,617,806	0.95	163,986,916
Florida	19,973,361	0.95	18,974,693
Georgia	149,740,420	0.95	142,253,399
Louisiana	20,538,744	1.00	20,538,744
Mississippi	26,313,171	0.95	24,997,512
South Carolina	617,762,696	1.00	617,762,696
	Sum of NB	Sum of (Nb x RF)/sum of NB	Sum of (NB x RF)
	523,210,806	Weighted mean = 0.960	502,098,022

[a] U.S. Department of Commerce, 1999.
[b] USDA NRCS, 1998.

Example

Box 1 illustrates the procedure used by USDA NRCS (1998) and the costing model for calculation of nutrient loading and land application for a typical 1,000-hog operation in the Midwest region. The animal unit (AU) conversion factor in Box 1 and Table 4-5 represents the number of animals having a combined weight of 1,000 pounds. For this example, for integrated swine operations, the average weight of a hog is 110 lb and the concomitant AU factor is 9.09 (1000 lb of animals/110 lb average hog weight). Each hog AU produces 14.69 tons of manure per year with a concentration after losses of 2.8 lb P/ton manure and 2.82 lb N/ton manure. For

this example, a regional recovery factor of 0.8 and nutrient uptake of 25 lb P/acre are used. The result is an acreage of 145 acres for application of all of the waste at agronomic phosphorus rates for a 1,000-swine farrow-to-finish operation.

Box 1. USDA's Method for Calculation of Nutrient Production and Land Application.

To calculate annual nutrient production:

$$Nutrient\ produced\ (\frac{lb}{yr}) = no.head\ /\ animal\ units\ conversion\ (\frac{no.head}{AU}) * \frac{tons\ manure}{yr \bullet AU} * nutrient\ concentation\ \frac{lb}{ton}$$

Substituting AWMFH values:

$$P\ produced\ (\frac{lb}{yr}) = 1000\ /\ 9.09 * 14.69 * 2.8 = 4{,}525\ \frac{lb\ P}{yr}$$

To calculate land required:

$$Land\ required\ (\frac{ac}{yr}) = P\ produced\ (\frac{lb}{yr}) * regional\ recovery\ factor\ (\%)\ /\ nutrient\ uptake\ (\frac{lb}{ac})$$

Substituting values from average of MPS-18, USDA, and NCSU data:

$$Land\ required\ (acres) = 4{,}525 * 0.80\ /\ 25 = 145\ acres$$

4.2.3 Sum of Nutrients Generated and Application Rates in a County

One of the key aspects of this methodology is characterizing whether an operation has enough land to apply at agronomic rates all of the animal waste generated on the operation, or whether there is enough nearby land (within the county) to apply the waste at agronomic rates. The nutrients generated from all swine, chicken, turkey, beef, and dairy operations were summed and compared to the nutrient application rate for all farms with cropland (including those without animals). This accounts for the potential competition for available cropland by <u>all</u> animal feeding operations in the area. For greater detail regarding the procedures applied, see USDA NRCS (1998).

4.2.4 Categorization of Land Availability Options

One of the key factors in determining the costs of compliance with the permitting alternatives is whether a model facility has enough land available to apply the manure generated at the facility at agronomic application rates. Three categories of model facilities were developed to characterize distinct situations based on the land available to apply manure. The manure handling methods and costs associated with these three categories of facilities vary considerably and are presented below.

Category 1
Category 1 model facilities have the acreage needed to apply agronomically the nutrients in the manure generated at the facility using regional estimates of crop uptake and yield goals. This acreage does not include the area of the buffer strip. Costs for nutrient management planning, establishment of buffer strips[1], and soil sampling are based on the acreage needed to apply agronomically the manure generated.

Category 2
Category 2 model facilities do not have the acreage needed to apply agronomically the nutrients in the manure generated at the facility using regional estimates of crop uptake and yield goals. Costs for nutrient management planning, establishment of buffer strips, and soil sampling are based on the average acreage of the particular model facility. These facilities incur additional costs to reduce the quantity of excess nutrient at the facility. Technologies and practices used to reduce excess nutrients at the model facility include feeding practices and manure hauling offsite. In addition, several technologies were evaluated to determine if their use would reduce the costs of hauling excess manure. In general, these technologies reduce the liquid content of the waste and result in a more concentrated waste being hauled. The distance each model facility would have to haul manure was determined by the facility's geographic region and whether it is located in a county that has an excess of the nutrient of concern. The national percentage of operations by size that are located in counties with excess nutrients was based on the 1997 Census of Agriculture obtained from USDA (Kellog et al., 2000). See Section 5.9.3.2 for manure hauling distances.

Category 3
Category 3 facilities do not have land used to grow any of the 24 major crops identified in the 1997 Census of Agriculture. No costs are assumed for nutrient management planning, establishment of buffer strips, and soil sampling. Some costs are assumed for manure testing, facility upgrades, and record keeping It is assumed that the facilities already haul their manure and that there are no additional costs for hauling their manure on a nitrogen basis.

Distribution of Category 1, 2, and 3
The distribution of category 1, 2, and 3 facilities by animal sector and nutrient basis (N or P) is presented in Table 4-8. To generate the percentages, EPA divided the number of farms meeting each of the category definitions by the total number of confinement operations. EPA obtained farm counts from the USDA analysis of the land availability method summarized in Section 4.2 as applied to facility-level data collected for the 1997 Census of Agriculture (USDA NASS,

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[1]Note that fully vegetated buffers were costed, including annual maintenance and rental value of the land, but the proposed requirements are for 100 foot manure application setbacks. Cost share and subsidized practices were not included. EPA expects the higher costs of buffers would be used as a dollar allowance for field management practices to reduce field runoff. See Section 5.6 for more details.

1999b). Animal feeding operations were uniquely assigned to animal sectors based upon the methodology described in Appendix A.

Table 4-8. Percentages of Operations Nationally Classified as Category 1, 2, and 3

Animal Sector	Size[a]	Cat 1		Cat 2		Cat 3
		N	P	N	P	Both N & P
Swine-GF	Medium	74.40	58.60	9.92	25.72	15.71
	Large	52.46	23.59	28.20	57.07	19.40
Swine-FF	Medium	83.82	66.49	6.26	23.59	9.93
	Large	63.64	32.41	16.72	47.65	19.94
Layer-wet	Medium	10.43	6.55	52.58	56.47	36.98
	Large	0.83	0.00	46.67	47.5	52.5
Layer-dry	Medium	6.60	0.60	56.97	62.97	36.43
	Large	0.83	0.00	46.67	47.5	52.5
Broiler	Medium	5.77	2.59	54.97	58.16	39.24
	Large	4.39	0.94	64.39	67.84	31.22
Turkey	Medium	6.24	0.23	65.36	71.36	28.41
	Large	3.25	0.00	57.99	61.25	38.75

[a] Medium is 300-1,000 Animal Units. Large is greater than 1,000 Animal Units.

Source: USDA NASS, 1999b

4.3 Effluent Limitation Guidelines Options

4.3.1 Existing Sources

Many options were analyzed as part of the effluent limitation guidelines (ELG) development process. For existing sources this analysis was done to identify the best available technology (BAT) that is economically achievable. The options were organized in a manner to incrementally add practices that would result in reduced pollutant effluent concentrations. The final options considered for BAT are presented below and summarized in Table 4-9.

Frequency factors were assigned to each practice to account for facilities that already implemented the practice (see Section 5.2 for a discussion of frequency factors).

Table 4-9. Summary of Practices and Technologies for ELG Options

Practice or Technology	Option							
	1	2	3	4	5	5b	6	7
Feedlot BMPs	X	X	X	X	X	X	X	X
Mortality handling	X	X	X	X	X	X	X	X
Nutrient management planning	X	X	X	X	X	X	X	X
Record keeping	X	X	X	X	X	X	X	X
Sample soils once every 3 years		X	X	X	X	X	X	X
Sample manure twice per year	X	X	X	X	X	X	X	X
Covered storage for dry poultry litter	X	X	X	X	X	X	X	X
Land application N-based	X							
Land application P-based where necessary		X	X	X	X	X	X	X
100-foot stream buffer/no manure application within 100 feet of surface water, tile drain inlets, and sinkholes	X	X	X	X	X	X	X	X
Assess hydrologic link			X	X				
Ground water monitoring wells			X	X				
Ground water sampling			X	X				
Impermeable pads under manure storage areas			X	X				
Construct new lagoon and add impermeable lagoon/pond liners			X	X				
Upstream/downstream monitoring				X				
Drier technologies (scrape system, solid/liquid separation)					X			
Retrofit to high-rise houses for swine and layers					X	X		
Anaerobic digester					X		X	
Increased storage for swine								X

<u>Option 1 - Nitrogen-Based Application of Manure</u>

Practices factored into the analysis of this option were:

- Feedlot BMPs (storm water diversions, lagoon/pond depth markers, periodic inspections, record keeping)
- Mortality handling (e.g., rendering, composting)
- Nutrient management planning
- Record keeping
- Sample soils once every 3 years
- Sample manure twice per year
- Covered storage for dry poultry litter
- Land application limited to N-based agronomic application rates
- 100-foot setback required (costed as a stream buffer), and do not allow manure application within 100 feet of surface water, tile drain inlets, and sinkholes

Option 2 - Phosphorus-Based Application of Manure

Practices factored into the analysis of this option were:

- Feedlot BMPs (storm water diversions, lagoon/pond depth markers, periodic inspections, record keeping)
- Mortality handling (e.g., rendering, composting)
- Nutrient management planning
- Record keeping
- Sample soils once every 3 years
- Sample manure twice per year
- 100-foot setback required, and do not allow manure application within 100 feet of surface water, tile drain inlets, and sinkholes
- Land application limited to P-based agronomic application rates where dictated by site-specific conditions, N-based applications elsewhere

Nitrogen- Versus Phosphorus-Based Application Rates

The nitrogen-to-phosphorus ratio in manure is typically much lower (approximately 2:1) than harvested crop nutrient removal ratios (approximately 6:1). Therefore, facilities that must land-apply their manure on a phosphorus basis rather than a nitrogen basis incur additional costs in two areas. First, a commercial source of nitrogen must be applied to their fields (termed sidedressing) to compensate for the nitrogen not supplied through manure application. A cost of 12.3¢ per pound of additional nitrogen required was used in the cost model. This was based upon the cost data shown in Table 4-10. Second, facilities that do not have enough land to apply all their manure at a phosphorus-based rate have to remove manure phosphorus produced at the facility through implementation of feeding strategies, hauling of excess manure, or both. The costs model performs a cost test to determine which of the three methods is the least expensive. The cost test compares the annual costs of each method where the annual costs are approximated by the sum of: the fixed costs, the annual costs, 14% of the capital costs (based on 10-year amortization), and one-third of the three-year recurring costs.

Table 4-10. Retail Cost of Nitrogen Fertilizer

Fertilizer	Retail Cost Per Pound of Nitrogen
Anhydrous Ammonia	14¢
Urea	12¢
Ammonium Nitrate	11¢
US Average	12.3¢

Source: The Fertilizer Institute, 1999

EPA estimated the number of facilities that will have to land-apply their manure on a phosphorus basis by using state soil test data (Sharpley et al., 1999). Consistent with EPA acknowledgment of site-specific differences, these data clearly show that high soil phosphorus levels are a regional problem. Distinct areas of general phosphorus deficit and surplus exist within states and regions and can be correlated to areas of intensive animal production. To develop the percentage of agricultural soils testing high in phosphorus on a regional basis, the percentage of soils testing high or above in phosphorus was weighted with the number of facilities in each state. The procedure used was similar to that used to develop the example in Table 4-7. Table 4-11 shows the results of the facility-weighted soil test values by region and animal type. The label "P" indicates that more than half of the facility-weighted soils tested high or above for phosphorus. An "N" indicates that less than half of the facility-weighted soil tests in the region were high in phosphorus. If the facility weighted soil test values indicated that more than half of the soils in the region tested high for phosphorus, it was assumed that 60 percent of the facilities will require a phosphorus-based manure application rate and 40 percent can use a nitrogen-based rate. If the facility-weighted soil test values indicated that less than half of the soils in the region tested high for phosphorus, it was assumed that 40 percent of the facilities will require a phosphorus-based manure application rate and 60 percent can use a nitrogen-based rate. This approach reflects the potential fluctuations in phosphorus soil tests in a given state.

Option 3 - Ground Water Protection

Practices factored into the analysis of this option were:

- All technologies and practices in Option 2
- Ground water requirements
  - Assess hydrologic link - Under this option, all facilities would have to assess the hydrologic link between surface water and ground water for their feedlot/production areas but not the land where manure is applied. See Section 5.5.2.3 for a description of the assessment process and costing features.
  - Additional practices - Only a portion of the facilities would need to implement additional practices. The portion of facilities required to implement additional practices was based on an assessment of ground water risk produced using USGS data (Sobecki and Clipper, 1999), and it is estimated as follows:

- Mid-Atlantic = 23.9 percent
- South = 22.4 percent
- Midwest = 27.5 percent
- Central = 12.6 percent
- Pacific = 12.3 percent

The additional practices costed where a hydrologic link is identified are:

- Install monitoring wells (4 costed per facility: one up gradient and three down gradient) (See Section 5.5.1.3)
- Perform ground water sampling twice per year (See Section 5.5.3.4.)
- Install impermeable pads under manure storage areas
- Old lagoon cleanout, construct new lagoon and add impermeable lagoon/pond liners.

Retrofit of a lagoon with liners is not typical of the industry (Tetra Tech, 1999). Note that cleanout was costed, but closure according to NRCS specifications was not specifically costed. Additional information obtained on the costs of lagoon closure indicates lagoon cleanout constitutes the greatest portion of closure costs (NCDENR, 1999).

Table 4-11. AFO Nutrient Management Planning Basis by Animal Sector and Region Based on Percentage of Agricultural Soils Analyzed by Soil Test Laboratories in 1997 That Tested High or Above for Phosphorus

Sector Industry	Farm Size	Regions				
		Central	Mid-Atlantic	Midwest	Pacific	South
Broilers	Medium	P	P	P	P	N
Cattle (beef)	Medium	N	P	N	P	N
Dairy	Medium	P	P	P	P	N
Layers (dry)	Medium	P	P	P	P	N
Layer (wet)	Medium	N	P	P	P	N
Swine	Medium	N	P	P	P	P
Turkey	Medium	N	P	P	P	P
Broilers	Large	P	P	P	P	N
Cattle (beef)	Large	N	P	N	P	P
Dairy	Large	P	P	P	P	N
Layers (dry)	Large	P	P	P	P	N
Layers (wet)	Large	P	P	P	P	N
Swine	Large	N	P	P	P	P
Turkey	Large	N	P	P	P	P

Key: N = less than half of the facility-weighted soil tests in the region were high in phosphorus.
P = more than half of the facility-weighted soils tested high or above for phosphorus.

<u>Option 4 - Surface Water Monitoring</u>

Practices factored into the analysis of this option were:

- All technologies and practices in Option 3
- Surface water monitoring requirements See Sections 5.5.1.4 and 5.5.3.5 for a description of the surface water monitoring costing.
    - Analyze samples upstream and downstream of both feedlot and land application areas (4 grab samples)
    - One annual sampling event in the absence of precipitation events to provide background conditions.
    - Sampling 12 times per year (triggered by > ½-inch precipitation within 24 hours of manure application; limited to no more than 12 times per year.

- Parameters to be monitored: total N, total P, total suspended solids (TSS). Other parameters considered for monitoring included metals, biochemical oxygen demand (BOD), and fecal coliform bacteria (FC), but these parameters were dropped due to cost (e.g., metals) and sampling holding and preservation concerns (eg., BOD and FC).

Option 5 - Drier Manure
Practices factored into the analysis of this option were:

- All technologies and practices in Option 2
- The lowest cost option from the following technologies to handle manure on a drier basis:
  - Retrofit scraper with above ground tank for manure storage (replacing flush systems with scraper systems to use less water)
  - Solid/liquid separation, covers over open impoundments, above ground tank for solids
  - High-rise housing

Storage was assumed to be constructed or modified in such a way as to prevent any discharge from the production areas (generally the animal confinement and manure storage areas). For most facilities this means covers for liquids impoundments or storage sheds for solid materials. Complete mix (heated) anaerobic digesters were also costed as a technology to meet Option 5 for swine operations, but the technology could not be implemented for all sizes of farms and is not considered appropriate for all existing manure management trains. The complete mix (heated) anaerobic digester is only likely to be the lowest cost technology for the largest model facilities (i.e. farm size “large 2"). For further information on digester technologies see the Rulemaking Record. High rise housing is described in section 5.6.

Option 5b - Dry Manure
Practices factored into the analysis of this option were:

- All technologies and practices in Option 2
- High-rise housing for all operations

Option 6 - Anaerobic Digester
Practices factored into the analysis of this option were:

- All technologies and practices in Option 2
- Anaerobic digesters

Anaerobic digesters may take the form of covered lagoons, methane recovery lagoons, or complete mix heated (mesophilic) digesters.

Option 7 - Increased Storage - No Application to Frozen Soil
Practices factored into the analysis of this option were:

- All technologies and practices in Option 2
- Additional storage for swine due to a restriction from applying manure and manure effluent to ground that is frozen or covered with snow. The duration of the "freeze-free" period is determined using data from the National Oceanic and Atmospheric Administration's National Climatic Data Center (NOAA/NCDC). See Appendix C for details regarding the methodology used. The need for extra days of storage for swine operations is based on the following information (NPPC, 1998):
  - 49% of medium-sized operations (300-1,000 AU) do not have adequate storage.
  - 32% of large operations (>1,000 AU) do not have adequate storage.

4.3.2 New Source Performance Standards

Options for new source performance standards (NSPS) were evaluated to determine if the costs of implementing the standards would be a barrier to entry for new operations. A new source is defined as "any source, the construction of which is commenced after the publication of proposed regulations prescribing a standard of performance." Technology to be utilized for new sources is evaluated by considering the best in-process and end-of-process control technology identified as BAT and considering the utilization of alternative production processes and operating methods.

The baseline assumption for new facilities is that there are no federal or state/local regulations requiring controls based on protecting water quality. It is assumed that new facilities will use the most advanced technology and operating methods currently in use. It is also assumed that operators of new facilities will be knowledgeable of environmentally sound practices. The NSPS model facilities match the ELG model facilities (i.e., the existing model farms) in terms of location, size, and land area.

4.3.2.1 Assumptions on Behavior of New Sources

It is assumed that the behavior of new facilities will be different than existing facilities. This is based on EPA site visits to newer facilities where new technology was demonstrated, the belief that new facilities will be more aware of innovations and new methods, and the believe that new facilities will have plans in place to address certain emerging issues before they begin construction. In areas where no assumption is presented, it is assumed that new facilities will operate under the same conditions as existing facilities.

General Assumptions Applied to New Sources

All new facilities will perform proper facility management such as installation of storm water diversion and performing periodic visual inspections and record keeping.

All new facilities will have handle their manure in a dry manner (see discussion on swine high-rise facilities and layer facilities below). New facilities will have advanced drinking water systems that detect and minimize leaks. These two factors will minimize the need for ground water well installation and testing.

All new facilities will handle mortality in an acceptable manner.

All new facilities will have plans in place to properly dispose of the waste (manure or litter) produced using nitrogen-based land application and hauling. The costs of land application and hauling are thus not attributable to the new standards except for the options that require phosphorus-based land application rates.

All new facilities will have nutrient management plans for their cropland. The facilities will follow these plans including manure spreader calibration and soil and manure testing to ensure crop requirements are met.

All new facilities will use feeding strategies to reduce the amount of excess nutrients in the waste.

Sector-Specific Assumptions

The available information indicates that the NSPS for new hog facilities should be high-rise buildings based on the total lower cost of this technology. The cost of the facility is estimated to be 10% more per pig space, with a modest increase in ventilation requirements. However, this cost is offset by increased production, the fact that no lagoon or equipment is required to handle liquid wastes, and the ease in handling the dry manure produced. Thus it was assumed that there are no additional costs associated with the use and management of swine high-rise facilities as the NSPS. See the Rulemaking Record for additional information on swine high-rise facilities.

New poultry facilities will have covered storage.

Wet layer facilities were not included in the analysis because most of the industry is already dry or converting to dry manure systems; the advantages of handling manure dry should result in new facilities being constructed as dry systems.

4.3.2.2 Options Considered for NSPS

All of the options considered for BAT were also evaluated for NSPS. See previous section for a list of practices included under each option. Two additional options were also considered. The first combined options 3 and 5 and the second required additional treatment to reduce BOD, pathogens, and volatile solids. The NSPS options analyzed and any difference with the corresponding BAT option are presented below. Table 4-12 provides a summary of the practices and technologies specified for each of the options.

The same frequency factors were used for NSPS options as were used for the ELG BAT options for record keeping and reporting, manure applicator training, groundwater assessment (options 3 and 4), surface water monitoring (option 4), and field buffers. All other options considered under NSPS were assumed to have no frequency factor of compliance (e.g., frequency equals zero).

Table 4-12. Summary of Practices and Technologies Costed Under Baseline (B) Conditions and Each NSPS Options

Practice or Technology	Option									
	B	1	2	3	4	5	6	7	8	9
Feedlot BMPs	X									
Training and certification of manure applicator every 3 years		X	X	X	X	X	X	X	X	X
Mortality handling	X									
Nutrient management planning	X									
Training for owner/operators in permit nutrient planning (PNP)		X	X	X	X	X	X	X	X	X
Record keeping and reporting		X	X	X	X	X	X	X	X	X
Sample soils once every 3 years	X									
Sample manure twice per year	X									
Covered storage for dry poultry litter	X									
Land application N-based	X									
Land application P-based - partial			X	X	X	X	X	X	X	X
100-foot stream buffer/no manure application within 100 feet of surface water, tile drain inlets, and sinkholes		X	X	X	X	X	X	X	X	X
Assess hydrologic link between cropland and groundwater				X	X					X
Impermeable pads under manure storage areas	X									
Upstream/downstream surface water monitoring					X					
Drier technologies (scrape system, solid/liquid separation, or high-rise houses)	X									
Anaerobic digester for swine							X			
Adequate storage	X									
Additional treatment									X	

NSPS Option 1 - Nitrogen-Based Application of Manure

As discussed previously, EPA assume that new facilities will use the most advanced technology and operating methods currently in use. It is also assumed that operators of new facilities will be knowledgeable of environmentally sound practices. Thus, additional costs were not included under any NSPS option for feedlot BMPs, mortality handling, nutrient management planning,

soil and manure sampling, covered storage for poultry, nitrogen-based manure application, impermeable pads under manure storage areas, drier technologies, and additional storage. Cost were included under NSPS option 1 for training and certification of manure applicators every 3 years, training for owner/operators in permit nutrient planning, record keeping and reporting, and the establishment and maintenance of a 100 foot stream buffer.

NSPS Option 2 - Phosphorus-Based Application of Manure

Costs were included for all the practices in NSPS option 1 and for phosphorus-based application of manure as described in sections 4.2 and 4.3.1.

NSPS Option 3 - Ground Water Protection

All costs for NSPS option 2 were included. Most of the costs for BAT option 3 were not included because the NSPS baseline results in waste being handled in a dry manner, and retrofit costs for existing liquid impoundments would not be necessary. If manure is handled in a dry manner only minimal ground water protection practices would be needed to meet requirements.

NSPS Option 4 - Surface Water Monitoring

All costs for NSPS option 3 were included as was the surface monitoring costs described in sections 5.5.1.5 and 5.5.3.5.

NSPS Option 5 - Drier Manure

The costs for NSPS option 5 was considered to be equal to those for NSPS option 2 because the NSPS baseline for both swine and poultry results in manure being handled in a dry manner.

NSPS Option 6 - Anaerobic Digester

The costs for NSPS option 6 was considered to be equal to NSPS option 2 with the addition of the construction and operation of an anaerobic digester as described in sections 5.6.1.6 and 5.6.2.5.

NSPS Option 7 - Increased Storage - No Application to Frozen Soil

The costs for NSPS option 6 was considered to be equal to NSPS option 2. No costs were associated with the additional storage requirement. This is based on the assumption that all new poultry facilities will have covered storage, full house cleanout generally occurs annually, and that all new layer and swine high-rise facilities will have one year of storage in the bottom level.

NSPS Option 8 - Additional Treatment to Reduce BOD, Pathogens, and Volatile Solids
Practices factored into the analysis of this option were:

- All technologies and practices in NSPS option 2.
- Additional treatments include the addition of lime to reduce pollutants and composting.

As stated previously, it is assumed that all new facilities handle their manure in a dry manner including practices to prevent contact with rain and to eliminate production area runoff. Therefore the costs for additional treatment are assumed to be associated with composting the wastes.

Capital costs for composting animal waste were based on estimates from the Minnesota Department of Agriculture (1995). Composting equipment costs for starting an on-farm composting operation can range from $20,000 to $125,000 and higher, depending on the size of the operation and the level of technology selected. For the purpose of this analysis, it was assumed that a structure was available to house the compost material. Thus, only a blower and pipe for air distribution were required to compost material in a static pile. The costs for piping and a blower was estimated at $10,000. Larger facilities require a dual pipe/blower set-up with an estimated cost of $20,000. It was assumed that swine operations are high rise facilities that already have pipe/blower systems in place.

Aerated static piles for composting were selected as the desired method for composting poultry wastes. Annual costs for aerated static pile systems were estimated by the Minnesota Department of Agriculture (1995) to range from $20 to $50 per ton of incoming material. The less expensive cost of $20 per ton was selected because much of the material needed for composting was assumed to already be at the new facilities. The incoming mass of wastes was estimated using USDA NRCS (1992) values for characterizing poultry waste litter. Additional bedding costs for layers was added because layer operations typically do not use bedding materials. The average size of a layer facility was estimated at 5,623 cubic feet per 100,000 bird spaces. Assuming a cost of $3 per straw bale, a volume of 12 cubic feet per bale, and a bedding thickness of 3 inches, the net cost of bedding is $0.014 per bird space per year. The capitol and annual costs for NSPS option 8 were applied to all facility types and all animal sectors.

NSPS Option 9 - Ground Water Protection and No Overflow

The costs for NSPS option 9 was considered to be equal to those for NSPS option 3 because the NSPS baseline for both swine and poultry results in manure being handled in a dry manner with no possibility of an overflow.

5.0 ON-FARM COSTS

A cost model was developed to determine the average facility costs and total industry costs of the proposed regulation revisions to the swine and poultry animal feeding industries. The cost model is used to assess different regulatory options and the costs to the regulated community. Costs are developed for multiple model operations based on their size, region, operation type (e.g., type of animal raised), and nutrient used in nutrient planning. The total national cost of the proposed regulation is then estimated by multiplying model facility costs by the number of facilities represented by each particular model. The rest of this section describes the approach to developing facility level costs.

5.1 Cost Categories

The costs are divided into four broad categories of costs:

- Nutrient Management Planning
- Facility Upgrades
- Land Application
- Practices That Reduce Excess Nutrients on the Farm

Costs include capital costs; fixed, one-time costs; non-annual but reoccurring costs; and annual costs. All costs are expressed in terms of 1997 dollars.

5.2 Frequency Factors

EPA recognizes that most individual farms have already implemented certain waste management techniques or practices that are called for in the regulatory options considered. Only costs that are the direct result of the proposed regulation are included in the cost model. Costs already routinely incurred by operations are not attributed to the proposed regulation. For example, costs incurred by facilities to meet current state requirements are not included.

To reflect baseline industry conditions, EPA has developed *frequency factors* to describe the percentage of the industry that already implements particular operations, techniques, or practices required by the proposed rule. Thus, frequency factors address those who need to implement an operation, technique, or practice in order to meet proposed requirements (e.g., ground water monitoring), and excludes those who already have the technology in place (e.g., storage). Frequency factors are based on geographic location, type and size of operation, existing regulatory requirements, and overall status of the industry. For example, all broiler feeding operations are assumed to own or have access to tractors with front-end loaders for use in cleaning out the broiler houses (frequency factor is 100 percent), and thus no costs are assumed for cleaning out the houses. Many operations, on the other hand, do not have storage sheds for their litter, and building the storage is costed in the model (frequency factor is less than 100 percent).

5.2.1 Development of Frequency Factors to Estimate Industry Level Costs

Data used to determine frequency factors varied depends upon the sector and component or practice. Industry and USDA data were used as the basis for most of the frequency factors for layers and swine, whereas analysis of state and federal regulations was used primarily for broilers and turkeys. EPA's States Compendium was also referred to for all animal sectors. Costs were not attributed to model facilities when state regulations specified standards equal to or more stringent than the proposed technology options. The source for each frequency factor is identified in Sections 5.5 through 5.8. Frequency factors are summarized in Appendix D.

EPA then applied these frequency factors to model farms to develop a weighted-average cost for each model farm. For example, if a practice costs $100 and 60 percent (the frequency factor) of the operations in the model category already implement the practice, the average cost to facilities represented by that model farm is $40. Each of these weighted-average costs is then multiplied by the number of facilities represented by the particular model farm to estimate industry-level costs.

Literature and industry data for the broiler and turkey sectors was generally not detailed enough to generate frequency factors. Instead, EPA reviewed the specific regulatory language and summaries of regulations for 12 major poultry-producing states regarding requirements for nutrient management plans (NMPs) at broiler and turkey facilities (Tetra Tech, 2000a). Requirements were considered for facilities in two size groups: 300-1,000 animal units and greater than 1,000 animal units. All broiler and turkey facilities were assumed to use dry waste management systems.

From the analysis of state and federal regulations, EPA determined that a few states already require broiler and turkey facilities to implement some of the components of a NMP. Except as specified for ground water and surface water requirements, and in cases where select frequency factors could be based on available industry data, the analysis from these 12 states were used to calculate regional frequency factors. These state regulation based frequency factors approximate the number of facilities that are currently required to implement NMP components and, therefore, must already incur costs for these components. Weighted averages were used to estimate frequency factors for each NMP component (for 300-1,000 AU and >1,000 AU), as illustrated in the example in Table 5-1.

Table 5-1. Illustration of Method to Calculate Frequency Factors from Weighted Averages

State	Number of Facilities in the State [a]	NMP Component Required by State?[b]	Weight
A	10	Yes	10
B	40	No	0
C	20	Yes	20
D	20	No	0
Regional Total	100		(30/100) = 0.30

[a] The number of facilities for broilers and turkeys differs within each state, so the overall regional frequency factors may be different for broilers versus turkeys. 1997 Census of Agriculture data (USDA-NASS, 1999) were used to determine the number of facilities in each state within the two size ranges, 300-1,000 AU and >1,000 AU.
[b] Components were assumed to *not* be required for states other than the 12 reviewed.

In the above example, the frequency factor for the region that includes the four states "A", "B", "C", and "D" is 0.30.

5.2.2 Sensitivity Analysis of Weighted Farm Costs

The model-farm approach which was used in the cost model provides the average cost a facility is projected to incur under the proposed regulatory options. EPA recognizes that this approach may underestimate or overestimate the projected costs for facilities that are on the extreme ends of applicability. For example, some facilities may already meet the proposed regulatory requirements; therefore, those facility costs will be zero. Alternatively, some facilities may currently meet very few of the proposed regulatory requirements; therefore, these operations will incur costs that are much higher than the average model facility cost. Technologies and practices with large capital costs or annual costs and low frequency factors are those most likely to result in weighted costs that are substantially different from the true costs to a facility.

To evaluate the significance of these modeling limitations, EPA performed sensitivity analyses on the cost model to evaluate the major drivers for the model farm costs and to compare the average model farm cost to the maximum cost a farm may incur for the proposed regulatory options. EPA performed two sensitivity runs: the first to compare the effects of nitrogen-based nutrient management verses phosphorus-based nutrient management on the costs; the second to compare the effects of groundwater monitoring requirements on the costs. This was done by running the model both with and without frequency factors. This allowed EPA to identify the costs of those technologies and practices that are most sensitive to EPA's modeling assumptions. EPA was then able to identify the model elements and cost components that were cost drivers and thus merit further analysis: the availability of cropland for manure utilization, the incremental costs of phosphorus based application over nitrogen based application, the costs of groundwater controls, and the costs of incremental storage for timing constraints.

EPA has already developed separate cost models to reflect nitrogen and phosphorus based requirements, and developed three categories of land availability to capture the wide range of land application and hauling costs. EPA's sensitivity analysis concluded the costs generated by the refined cost models were stable over a wide range of modeling assumptions (See Development Document). To further examine the cost impacts under different financial assumptions such as varying revenue, farm performance, and net returns, EPA conducted sensitivity analyses (See Economic Analysis, Appendix D).

Nutrient Application Basis Analysis:

Under the proposed regulatory options, a facility will be required to follow either nitrogen-based nutrient management or phosphorus-based nutrient management. More cropland is required to land apply manure waste at agronomic phosphorus-based rates than nitrogen-based rates; therefore, phosphorus-based nutrient management incurs more costs for land application, irrigation, nutrient management planning, supplemental nitrogen fertilizer, and off-site transportation of manure and wastes.

To evaluate the significance of the nutrient application basis on the costs, a sensitivity analysis was performed on Option 2. Option 2 costs are based on a combination of nitrogen-based and phosphorus-based nutrient management, and are also the basis for the costs in Options 3 through 8. To perform this analysis, the frequency of facilities that would be located in a phosphorus-based nutrient management area was set to 100 percent (no facilities were costed under the nitrogen-based management scenario.)

Because more cropland is required for phosphorus-based application, operations that are Category 1 operations under nitrogen-based nutrient management may be reclassified as a Category 2 operation under phosphorus-based nutrient management. That is, a facility with enough land to apply all of the manure waste on site under nitrogen-based application may not have enough land to apply all of their manure waste on site under phosphorus-based nutrient management. Because of this, the most dramatic comparison of the effects of changing the agronomic basis from nitrogen to phosphorus is seen by comparing the results of Option 1 (N-Based Application), Category 1 facilities to the sensitivity run Option 2A (P-based Application), Category 2 facilities.

Comparing these results shows a general 70% increase in the industry level costs. This increase is due to the following factors:

- Shift of facilities from Category 1 to Category 2 (thereby incurring transportation costs);
- A portion of Category 2 facilities under N-based application are assumed to not incur transportation costs, while they do incur these costs under P-based application; and
- Larger acreage for phosphorus-based facilities, requiring more irrigation costs, soil sampling; and nutrient management planning.

Groundwater Protection Option Analysis

Under the proposed regulatory Options 3 and 4, facilities will be required to assess if they are located in hydro-geologically sensitive areas and to implement groundwater protection if manure waste is stored or land applied on soil that has a hydrologic link to groundwater. If the facility has such a link, then the facility must take measures to ensure groundwater protection, including synthetically lining surface impoundments (e.g., lagoons and ponds), providing an impervious surface upon which to store dry manure, installing groundwater wells, and performing annual monitoring of these wells. If the facility is not located in a hydro-geologically sensitive area, then the facility does not incur any of these groundwater protection costs other than the hydro-geologic evaluation.

To evaluate the significance of the groundwater protection requirement on the costs for Options 3 and 4, a sensitivity analysis was performed on Option 3. Option 3 was selected to perform this evaluation because the basis for the costs in Option 3 is identical to the Option 2 costs (phosphorus-based application), with the addition of the groundwater protection costs; therefore, a direct comparison can be made between the costs for a facility with no groundwater protection requirements and a facility with these requirements by setting the groundwater frequency factors to 100%.

Facilities costed for Option 3A are those facilities where the groundwater assessment was found to be positive (all groundwater protection costs are included), and facilities costed for Option 3B are those where the groundwater assessment was found to be negative (no groundwater protection costs are included). The results show that a facility that incurs 100% of the groundwater protection costs incurs capital and annual O&M costs 67% higher than those facilities that do not incur groundwater protection costs. This increase is due to the following factors:

- installation and monitoring of four groundwater wells
- installation and maintenance of impermeable pad for dry manure storage
- installation and maintenance of composting facilities for poultry operations
- installation and maintenance of synthetic and clay lining for lagoons and ponds.

5.3 Regional Factors

The cost model addresses variations between operations in different regions of the country. For example, the crop nutrient removal rates, which are used to set manure application rates, vary among regions of the country based on average crop yields in each region. Many of the costs in the model rely on the manure and associated nutrient production of the animals at an operation, and is affected by regional differences such as climate and rainfall. Some frequency factors may also vary by region when data was available to differentiate the “key regions” (see Section 5.4).

5.4 Key Regions

As described in Section 4.1, model farms were developed based upon animal and operation type, size of operation, and location. The five regions identified by EPA are the Central, Mid-Atlantic, Midwest, Pacific, and South regions, but EPA developed key regions to focus cost modeling efforts on areas where the various animal industries are concentrated. The key regions chosen for swine operations are the Mid-Atlantic and Midwest because 78 percent of the hog operations are located in those two regions. To provide coverage of all relevant operations in the cost model, however, those operations in regions other than the key regions were divided evenly among the two key regions. For example, the Midwest region is actually a combination of operations from the Midwest with a portion of the operations from the Pacific, Central, and South regions. Similarly, the Mid-Atlantic region includes operations from the Mid-Atlantic, as well as a portion of the operations from the Pacific, Central, and South regions. In this manner all facilities are counted and costed. This approach assumes operations in areas outside of the key regions produce animals and handle manure similarly to those operations in the key regions.

The key regions for poultry are those regions with the largest number of AFOs. Thus the key regions for broilers are the Mid-Atlantic and South, while the Mid-Atlantic and Midwest are the key regions for turkeys. Wet layers are predominantly located in the South, while the South and Midwest are the key regions for dry layers. Operations from the other regions were folded into the key regions for these animal types in the same manner as described above for swine operations.

5.5 Nutrient Management Planning

The Nutrient Management Plan[2] costs are divided into three sections—fixed, one-time costs; non-annual, reoccurring costs; and annual costs. The following subsections focus on the following generally recognized components of a NMP:

- Training and certification for manure application
- Development of NMP
- On-farm NMP development every 3 years[3]
- Assessment of crop field/ground water link to surface water
- Ground water monitoring well installation, and operation and maintenance
- Surface water monitoring
- Soil auger

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[2] EPA is using the term Permit Nutrient Plan (PNP) to describe those elements of a Nutrient Management Plan that would be required under the proposed regulations.

[3] Non-capital costs are grouped as either: fixed first year (one time only) costs, annual (recurring) costs, or 3 year recurring costs. Costs that are not annual or 3 year recurring were adjusted to reflect the costs as if the costs were 3 year recurring costs. For example, a six year recurring cost was attributed to the model facility as a three year recurring cost paid half in year three and half in year six.

- Soil testing every 3 years
- Manure sampler
- Manure testing
- Scales for manure spreader calibration
- Calibration of manure spreader
- Record keeping (e.g., recording animal inventories, manure generation, field application of manure dates and rates, manure and soil analysis compilation, crop yields, etc.)
- Hauling of excess manure or litter
- Storage (usually storage sheds for poultry litter)
- Mortality composting facility, and operation and maintenance
- Storm water diversion, and operation and maintenance
- Lagoon depth marker for liquid impoundments
- Lagoon liner, and operation and maintenance for liquid impoundments
- Buffer (or application setbacks) establishment
- Visual inspections
- Feeding strategies

5.5.1 Fixed, One-Time Costs

5.5.1.1 Training and Certification for Manure Application

The cost of training and certifying personnel who apply manure is assumed to be $117 and includes a course fee of $25,[4] labor lost for missed work (1 day at $10/hr), and other direct costs such as travel to attend the course, which is assumed to be 15 percent of labor costs. It is assumed this 3-year recurring cost due to applicator turnover.

The frequency factors for training and certification at layer (United Egg Producers /United Egg Association, 1999) and swine (USDA APHIS, 1995) facilities were based upon industry data, while the frequency factors for broiler and turkey facilities were derived from an analysis of state regulations (Tetra Tech, 2000a).

[4] Training costs based on state pesticide certification testing costs determined from various state extension services.

Frequency Factors: Certification of Manure Applicators

Region/Size	Sector			
	Swine	**Broiler**	**Layers**	**Turkeys**
Midwest/medium	0.0		5	0
Midwest/large	27.5			0
Mid-Atlantic/medium	0.0	16.6	5	0.4
Mid-Atlantic/large	27.1	12.1		1.3
South/medium		0	5	
South/large		0		

For swine, Midwest/medium <2,500 head, and MW/large ≥ 2,500 head; MA/medium <2,500 head, and MA/large ≥ 2,500 head.
For broilers, MA/medium = 300-1,000 AU and MA/large > 1,000 AU; SO/medium = 300-1,000 AU and SO/large > 1,000 AU.
For layers, no distinction is made between medium and large.
For turkeys, MW/medium = 300-1,000 AU and MW/large > 1,000 AU; MA/medium = 300-1,000 AU and MA/large > 1,000 AU.

5.5.1.2 Owner/Operator Permit Nutrient Management Planning (PNMP) Training

It was assumed that the owner/operator would incur costs to be properly trained on the permit requirements related to nutrient management planning. It was also assumed that owner/operators are knowledgeable of nutrient management planning in general and thus the PNMP training would not be extensive. The costs were estimated based on 16 hours of training, eight hours of home study, and a $100 course fee. The labor rate of the owner operator was estimated at $20/hour. The fixed non-amortizable total costs of $580 is attributable to all category 1 and 2 facilities for all animal sectors.

5.5.1.3 Ground Water Well Installation and Initial Sampling

The cost for monitoring well installation ($5,735) is based on installing four 50-foot-deep wells, one up-gradient and three down-gradient from the manure storage facility. The cost includes well drilling at $21/ft, well casing at $2/ft for the upper 30 feet, well screening of the lower 20 feet at $3/ft, and gravel for the entire 50 feet at $1/ft. A protective casing for each well head is valued at $120. A bailer, which samples water from the well, costs $35 and can be used to test all the wells on the farm. Ground water well installation data were compiled from two sources (A.C. Schultes, Inc., 1999, and USEPA, 1998). An initial ground water sample is required for each well in the first year after installation to determine baseline concentrations ($85 per well, including 1 hour of labor at $10/hr and $75 for laboratory analysis of the water sample).

Analysis of samples includes total coliform (TC), fecal coliform (FC), nitrate-nitrogen, ammonia-nitrogen, chloride, and total dissolved solids (TDS). Subsequent ground water monitoring costs are incurred as annual costs (two samples per year, with two samples taken in the first year in addition to the initial samples).

It was assumed that no broiler and turkey facilities are currently required to install ground water monitoring wells, and only those facilities on agricultural land with a potential for ground water contamination would actually be subject to this requirement if imposed by EPA. EPA assumed the lack of water to serve as the transport mechanism for discharge to groundwater makes it highly unlikely for a facility with dry manure systems to discharge to groundwater. This is reflected by the absence of liner costs for poultry facilities as described in section 5.6.1.3.

As described in Section 5.2, the frequency factors for well installation and initial sampling for all sectors were calculated as 100 minus the percentage of acreage with potential for ground water contamination (see Section 5.6.1.3) since this percentage would not be subject to ground water monitoring requirements if imposed. The percentage of acreage in each region with the potential for ground water contamination was provided by Sobecki and Clipper (1999).

Frequency Factors: Ground Water Well Installation and Initial Sampling

Region/Size	**Sector**			
	Swine	**Broiler**	**Layers**	**Turkeys**
MidWest/medium	72.54		72.54	72.54
MidWest/large	72.54			72.54
MidAtlantic/medium	76.09	76.09	76.09	76.09
MidAtlantic/large	76.09	76.09		76.09
South/medium		77.55	77.55	
South/large		77.55		

For swine, Midwest/medium <2,500 head, and MW/large ≥ 2,500 head; MA/medium <2,500 head, and MA/large ≥ 2,500 head.
For broilers, MA/medium = 300-1,000 AU and MA/large > 1,000 AU; SO/medium = 300-1,000 AU and SO/large > 1,000 AU.
For layers, no distinction is made between medium and large.
For turkeys, MW/medium = 300-1,000 AU and MW/large > 1,000 AU; MA/medium = 300-1,000 AU and MA/large > 1,000 AU.

5.5.1.4 Surface Water Monitoring

Table 5-2 provides a detailed estimate of initial costs for surface water sampling. Initial costs include a training course (4-hour course, 4-hour preparation, course fee, and miscellaneous other costs); two coolers for sample storage and shipping; and sampling supplies, including a pipette and waders. The initial one-time cost is $392. Analytical costs and parameters monitored are described in Section 5.5.3.5.

Table 5-2. Detailed Estimate of Initial Costs for Surface Water Sampling

Description	Unit Cost ($)	Initial Cost ($)
Training (8 hr)	10.00	80.00
Course fee	40.00	40.00
Misc. other costs (15% of labor)	--	12.00
Coolers (2)	30.00	60.00
Sampling equipment (pipette, etc.)	200.00	200.00
	TOTAL INITIAL COST	392.00

The frequency factors for surface water monitoring at layer facilities were assumed to be zero based on site visits, those for swine were based upon industry data (USDA APHIS, 1995), and those for broiler and turkey facilities were derived from an analysis of state regulations (Tetra Tech, 2000a).

Frequency Factors: Surface Water Monitoring

Region/Size	Sector			
	Swine	**Broiler**	**Layers**	**Turkeys**
MidWest/medium	4.60		0	0
MidWest/large	27.90			0
MidAtlantic/medium	5.70	0	0	0
MidAtlantic/large	17.90	0		0
South/medium		0	0	
South/large		0		

For swine, Midwest/medium <2,500 head, and MW/large ≥ 2,500 head; MA/medium <2,500 head, and MA/large ≥ 2,500 head.
For broilers, MA/medium = 300-1,000 AU and MA/large > 1,000 AU; SO/medium = 300-1,000 AU and SO/large > 1,000 AU.
For layers, no distinction is made between medium and large.
For turkeys, MW/medium = 300-1,000 AU and MW/large > 1,000 AU; MA/medium = 300-1,000 AU and MA/large > 1,000 AU.

5.5.1.5 Soil and Manure Sampling and Calibration of Equipment

The manure sampler ($30) consists of a hollow conduit long enough to extend to the bottom of the lagoon, pit, or other storage structure. In the case of solid manure, a shovel or similar device is sufficient to obtain a representative sample and no cost is assumed. Additional fixed, one-time costs include the purchase of a soil auger at $25 (ASC Scientific, 1999), and two scales for calibration of the manure spreader (one under each wheel at $250 each).

The frequency factors for soil augers at layer (UEP/UEA) and swine (NPPC, 1998) facilities were based upon industry data, while the frequency factors for broiler and turkey facilities were derived from an analysis of state regulations (Tetra Tech, 2000a). In cases where states require soil testing at broiler and turkey facilities, it was assumed that soil augers (or an equivalent technology) are also required or otherwise available to the facility, and thus not costed.

Frequency Factors: Soil Auger

Region/Size	Sector			
	Swine	**Broiler**	**Layers**	**Turkeys**
MidWest/medium	0.0		34.3	0
MidWest/large	94.0			10.1
MidAtlantic/medium	0.0	16.6	63.2	0.4
MidAtlantic/large	94.0	12.1		1.3
South/medium		0	50	
South/large		23.1		

For swine, Midwest/medium <2,500 head, and MW/large ≥ 2,500 head; MA/medium <2,500 head, and MA/large ≥ 2,500 head.
For broilers, MA/medium = 300-1,000 AU and MA/large > 1,000 AU; SO/medium = 300-1,000 AU and SO/large > 1,000 AU.
For layers, no distinction is made between medium and large.
For turkeys, MW/medium = 300-1,000 AU and MW/large > 1,000 AU; MA/medium = 300-1,000 AU and MA/large > 1,000 AU.

The frequency factors for manure samplers at layer (UEP/UEA) and swine (NPPC, 1998) facilities were based upon industry data, while the frequency factors for broiler and turkey facilities were derived from an analysis of state regulations (Tetra Tech, 2000a). In cases where states require manure testing at broiler and turkey facilities, it was assumed that manure samplers (or an equivalent technology) are also required or otherwise available to the facility, and thus not costed.

Frequency Factors: Manure Sampler and Calibration of Equipment

Region/Size	Sector			
	Swine	**Broiler**	**Layers**	**Turkeys**
MidWest/medium	0.0		70.6	0
MidWest/large	71.9			10.1
MidAtlantic/medium	0.0	16.6	56.2	0.4
MidAtlantic/large	71.9	12.1		1.3
South/medium		0	75	
South/large		0		

For swine, Midwest/medium <2,500 head, and MW/large ≥ 2,500 head; MA/medium <2,500 head, and MA/large ≥ 2,500 head.
For broilers, MA/medium = 300-1,000 AU and MA/large > 1,000 AU; SO/medium = 300-1,000 AU and SO/large > 1,000 AU.
For layers, no distinction is made between medium and large.
For turkeys, MW/medium = 300-1,000 AU and MW/large > 1,000 AU; MA/medium = 300-1,000 AU and MA/large > 1,000 AU.

The frequency factors for calibration scales at layer (UEP/UEA, 1999) and swine (NPPC, 1998) facilities were based upon industry data, while the frequency factors for broiler and turkey facilities were derived from an analysis of state regulations (Tetra Tech, 2000a). In cases where states require calibration of manure spreaders at broiler and turkey facilities, it was assumed that calibration scales (or an equivalent calibration technology or method) are also required or otherwise available to the facility, and thus not costed. Calibration of solid manure spreaders can be performed in a number of ways, some of which are based on volume instead of weight, and liquid-based systems can also be calibrated in terms of volume. Methods for calibration of manure spreaders are described in greater detail in Chapter 8 of the Technical Development Document.

Weighing the spreader before and after application provides accurate results. It is the ideal methodology for wet or dry manure calibration because it is relatively quick and produces accurate results. This approach is unsuitable for manure application devices such as umbilical applicators. Instead, the volume of manure injected must be first be determined. The procedure includes collection of pumped material into a bucket to determine the flow rate, which decreases initial calibration costs. Some operations that handle their manure in a drier form may elect a less expensive calibration method. By spreading manure on a tarp and weighing it on a less expensive hanging balance, initial calibration costs would be reduced. Refer to section 5.5.3.3 for details on assumptions of annual calibration costs.

Frequency Factors: Scales for Calibration of Manure Spreader

Region/Size	Sector			
	Swine	**Broiler**	**Layers**	**Turkeys**
MidWest/medium	0.0		61.8	0
MidWest/large	71.9			0
MidAtlantic/medium	0.0	16.6	29.6	0.4
MidAtlantic/large	71.9	12.1		1.3
South/medium		0	50	
South/large		0		

For swine, Midwest/medium <2,500 head, and MW/large ≥ 2,500 head; MA/medium <2,500 head, and MA/large ≥ 2,500 head.
For broilers, MA/medium = 300-1,000 AU and MA/large > 1,000 AU; SO/medium = 300-1,000 AU and SO/large > 1,000 AU.
For layers, no distinction is made between medium and large.
For turkeys, MW/medium = 300-1,000 AU and MW/large > 1,000 AU; MA/medium = 300-1,000 AU and MA/large > 1,000 AU.

5.5.2 Non-annual, Reoccurring Costs

Nonannual, reoccurring costs are the costs for activities done repeatedly but not annually. These costs are divided by the number of years between their occurrence to obtain an annualized cost.

5.5.2.1 On-Farm Nutrient Management Plan (NMP) Development

The cost for development of an on-farm NMP is the product of the farm size (number of tillable acres) and a NMP rate in dollars per acre. NMP rates vary depending on the level of services (e.g., soil sampling, manure sampling, and analysis). The NMP rate selected was $5 per tillable acre. This value was selected because soil and manure testing were costed separately from NMP and the higher costs for NMP development are usually attributed to testing costs. Revision and a complete rewrite of an on-farm NMP is costed to occur every 3 years. Annual review of the NMP is costed under recordkeeping. While the proposed regulation would require that PNPs are rewritten at a minimum of once every 5 years, a revision frequency of once every 3 years was assumed in cost modeling to cover additional costs for PNP modifications (and notification of modifications) that could be necessary any year due to changes in crops, animal production, or soil measurements.

The frequency factors for development of an on-farm NMP at layer (UEP/UEA, 1999) and swine (USDA APHIS, 1995) facilities were based upon industry data, while the frequency factors for

broiler and turkey facilities were derived from an analysis of state regulations (Tetra Tech, 2000a). Revision of plans at broiler and turkey facilities was considered to occur only if explicitly mentioned in the state regulations.

Frequency Factors: Initial Nutrient Management Plan Development

Region/Size	Sector			
	Swine	**Broiler**	**Layers**	**Turkeys**
MidWest/medium	10.7		69.4	0
MidWest/large	46.9			0
MidAtlantic/medium	24.9	16.6	56.7	0.4
MidAtlantic/large	69.4	12.1		1.3
South/medium		0	75	
South/large		23.1		

For swine, Midwest/medium <2,500 head, and MW/large ≥ 2,500 head; MA/medium <2,500 head, and MA/large ≥ 2,500 head.
For broilers, MA/medium = 300-1,000 AU and MA/large > 1,000 AU; SO/medium = 300-1,000 AU and SO/large > 1,000 AU.
For layers, no distinction is made between medium and large.
For turkeys, MW/medium = 300-1,000 AU and MW/large > 1,000 AU; MA/medium = 300-1,000 AU and MA/large > 1,000 AU.

Frequency Factors: Nutrient Management Plan On-Farm Recurring (Revisions to Plans)

Region/Size	Sector			
	Swine	**Broiler**	**Layers**	**Turkeys**
MidWest/medium	10.7		69.4	0
MidWest/large	46.9			0
MidAtlantic/medium	24.9	16.6	56.7	0.4
MidAtlantic/large	69.4	12.1		1.3
South/medium		0	75	
South/large		0		

For swine, Midwest/medium <2,500 head, and MW/large ≥ 2,500 head; MA/medium <2,500 head, and MA/large ≥ 2,500 head.
For broilers, MA/medium = 300-1,000 AU and MA/large > 1,000 AU; SO/medium = 300-1,000 AU and SO/large > 1,000 AU.
For layers, no distinction is made between medium and large.
For turkeys, MW/medium = 300-1,000 AU and MW/large > 1,000 AU; MA/medium = 300-1,000 AU and MA/large > 1,000 AU.

5.5.2.2 On-Farm Soil Testing

On-farm soil testing should be carried out at least once every 3 years. A soil sampling rate of one composite sample per 10 tillable acres was selected for use in this model, based upon a review of federal and state soil sampling recommendations. A composite soil sample was estimated to take 1 hour because of the distance between samples, and labor costs for soil sampling were assumed to be $10/hr. Costs for soil analysis for major nutrients and important soil characteristics were estimated at $10 per sample based on a review of costs by state NRCS labs.

The frequency factors for soil testing at layer (UEP/UEA, 1999) and swine (NPPC, 1998) facilities were based upon industry data, while the frequency factors for broiler and turkey facilities were derived from an analysis of state regulations (Tetra Tech, 2000a).

Frequency Factors: Soil Testing

Region/Size	Sector			
	Swine	**Broiler**	**Layers**	**Turkeys**
MidWest/medium	90.0		34.3	0
MidWest/large	94.0			10.1
MidAtlantic/medium	90.0	16.6	63.2	0.4
MidAtlantic/large	94.0	12.1		1.3
South/medium		0	50	
South/large		23.1		

For swine, Midwest/medium <2,500 head, and MW/large ≥ 2,500 head; MA/medium <2,500 head, and MA/large ≥ 2,500 head.
For broilers, MA/medium = 300-1,000 AU and MA/large > 1,000 AU; SO/medium = 300-1,000 AU and SO/large > 1,000 AU.
For layers, no distinction is made between medium and large.
For turkeys, MW/medium = 300-1,000 AU and MW/large > 1,000 AU; MA/medium = 300-1,000 AU and MA/large > 1,000 AU.

5.5.2.3 Assessment of Feedlot/Ground Water Link to Surface Water

An assessment of the ground water link to surface water at the production areas every 5 years requires technical expertise; therefore, a professional pay rate[5] ($55/hr) was used. Activities include a limited review of local geohydrology, topography, proximity to surface waters, and current animal waste management practices. It was assumed that the professional assessor requires 16 hours of on-farm time, 16 hours of in-office time, and 16 hours for compiling existing data into a final report (48 hours total). Four hours were allotted for the farm operator at $10/hr to collect and present relevant information to the assessor. Miscellaneous expenses (assumed to be 15 percent of labor costs) included travel time, photocopying, purchasing maps, report generation, and other direct costs, yielding a total estimated cost of $3,082 to assess groundwater links to surface water.

The frequency factors for these assessments at layer and swine facilities were based upon industry (UEP/UEA, 1999) or USDA (USDA,1995) data, while the frequency factors for broiler and turkey facilities were conservatively assumed to be zero.

[5]Professional pay rate for hydrologist based upon contractor experience with similar work.

Frequency Factors: Already Assess Ground Water Links to Surface Water

Region/Size	Sector			
	Swine	**Broiler**	**Layers**	**Turkeys**
MidWest/medium	1.1		10.9	0
MidWest/large	23.1			0
MidAtlantic/medium	7.4	0	12.7	0
MidAtlantic/large	12.3	0		0
South/medium		0	40	
South/large		0		

For swine, Midwest/medium <2,500 head, and MW/large ≥ 2,500 head; MA/medium <2,500 head, and MA/large ≥ 2,500 head.
For broilers, MA/medium = 300-1,000 AU and MA/large > 1,000 AU; SO/medium = 300-1,000 AU and SO/large > 1,000 AU.
For layers, no distinction is made between medium and large.
For turkeys, MW/medium = 300-1,000 AU and MW/large > 1,000 AU; MA/medium = 300-1,000 AU and MA/large > 1,000 AU.

5.5.3 Annual Costs

5.5.3.1 Manure Testing

Manure testing costs are based on sampling twice per year to reflect the requirement in the proposed rule that manure be sampled at least once per year. The cost of manure sampling includes the labor required and the manure nutrient analysis. For all poultry and swine facilities, one hour is required to sample the main storage area. For dry poultry, an additional 0.25 hours per house is required to acquire a composite sample from each house. Labor rates are $10/hr. Manure analysis was estimated at $40 per sample based on a review of costs by state soil conservation service labs.

The frequency factors for manure testing at layer (UEP/UEA, 1999) and swine (USDA APHIS, 1995) facilities were based upon industry data, while the frequency factors for broiler and turkey facilities were derived from an analysis of state regulations (Tetra Tech, 2000a).

Frequency Factors: Manure Testing

Region/Size	Sector			
	Swine	**Broiler**	**Layers**	**Turkeys**
MidWest/medium	2.1		70.6	0
MidWest/large	38.3			10.1
MidAtlantic/medium	6.1	16.6	56.2	0.4
MidAtlantic/large	29.9	12.1		1.3
South/medium		0	75	
South/large		0		

For swine, Midwest/medium <2,500 head, and MW/large ≥ 2,500 head; MA/medium <2,500 head, and MA/large ≥ 2,500 head.
For broilers, MA/medium = 300-1,000 AU and MA/large > 1,000 AU; SO/medium = 300-1,000 AU and SO/large > 1,000 AU.
For layers, no distinction is made between medium and large.
For turkeys, MW/medium = 300-1,000 AU and MW/large > 1,000 AU; MA/medium = 300-1,000 AU and MA/large > 1,000 AU.

5.5.3.2 Record Keeping and Reporting

Record keeping costs ($880) include the cost of recording animal inventories, manure generation, field application of manure and other nutrients (amount, rate, method, incorporation, dates), manure and soil analysis compilation, crop yield goals and harvested yields, crop rotations, tillage practices, rainfall and irrigation, lime applications, findings from visual inspections of feedlot areas and fields, lagoon emptying, and other activities on a monthly basis. Records may include manure spreader calibration worksheets, manure application worksheets, maintenance logs, soil and manure test results, and documentation of corrective actions taken in response to findings from visual inspections. Eight hours were assumed to be needed to prepare an annual report on animal inventories, manure generation, and overall manure application. Three hours each (72 hours annually) are assumed necessary for monthly write-ups and monthly field observations. Thus, a total of 80 hours annually was estimated for record keeping at $10/hour. Other costs associated with record keeping, including obtainment of signed certifications of proper manure application from off-site manure recipients, were estimated at 10 percent of labor costs. It was assumed that off-site recipients of manure incurred no cost to certify proper manure application due to economic benefits derived from the manure.

The frequency factors for record keeping at layer (UEP/UEA) and swine (USDA APHIS, 1995) facilities were based upon industry data, while the frequency factors for broiler and turkey

facilities were derived from an analysis of state regulations (Tetra Tech, 2000a). Note the high occurrence of recordkeeping at swine and layer operations does not mean these operations already record all pertinent information, but rather the time and effort necessary to maintain the records is already expended by the operator.

Frequency Factors: Record Keeping

Region/Size	Sector			
	Swine	**Broiler**	**Layers**	**Turkeys**
MidWest/medium	71.0		99	0
MidWest/large	98.9			10.1
MidAtlantic/medium	93.1	16.6	99	0.4
MidAtlantic/large	99.9	12.1		1.3
South/medium		0	99	
South/large		23.1		

For swine, Midwest/medium <2,500 head, and MW/large ≥ 2,500 head; MA/medium <2,500 head, and MA/large ≥ 2,500 head.
For broilers, MA/medium = 300-1,000 AU and MA/large > 1,000 AU; SO/medium = 300-1,000 AU and SO/large > 1,000 AU.
For layers, no distinction is made between medium and large.
For turkeys, MW/medium = 300-1,000 AU and MW/large > 1,000 AU; MA/medium = 300-1,000 AU and MA/large > 1,000 AU.

5.5.3.3 Calibration of Manure Spreader

The cost for manure spreader calibration was estimated at $100 based on 4 hours of labor, at $10 per hour, for both wet and dry applicators and 2 hours of tractor time at $30 per hour. It was assumed that the time required for calibration included gathering required equipment, loading manure, weighing the spreader before and after land application, and applying manure to a known area of cropland. Additional time was required to perform calculations on manure application rates.

The frequency factors for spreader calibration at layer facilities were based upon industry data (UEP/UEA), those for swine facilities were based upon data from the AFO Strategy (USEPA, 1999b), and those for broiler and turkey facilities were derived from an analysis of state regulations (Tetra Tech, 2000a).

Frequency Factors: Calibration of Manure Spreader

Region/Size	Sector			
	Swine	**Broiler**	**Layers**	**Turkeys**
MidWest/medium	0.0		61.8	0
MidWest/large	99.0			0
MidAtlantic/medium	0.0	16.6	64	0.4
MidAtlantic/large	99.0	12.1		1.3
South/medium		0	50	
South/large		0		

For swine, Midwest/medium <2,500 head, and MW/large ≥ 2,500 head; MA/medium <2,500 head, and MA/large ≥ 2,500 head.
For broilers, MA/medium = 300-1,000 AU and MA/large > 1,000 AU; SO/medium = 300-1,000 AU and SO/large > 1,000 AU.
For layers, no distinction is made between medium and large.
For turkeys, MW/medium = 300-1,000 AU and MW/large > 1,000 AU; MA/medium = 300-1,000 AU and MA/large > 1,000 AU.

5.5.3.4 Operation and Maintenance for Ground Water Monitoring

Ground water monitoring operation and maintenance costs were estimated at 2 percent of initial costs ($57.70). Additional costs include two samples per year for each well, with 1 hour of labor required for each sample (at $10/hr) and $75 per sample for laboratory analysis of total coliform (TC), fecal coliform (FC), nitrate-nitrogen, ammonia-nitrogen, chloride, and total dissolved solids (TDS). Therefore, the total annual cost for ground water monitoring is $231.

As described in Section 5.2, the frequency factors for the operation and maintenance of ground water monitoring for all sectors were calculated as 100 minus the percentage of acreage with potential for ground water contamination (see Section 5.6.1.3) since this percentage would not be subject to ground water monitoring requirements if imposed. The percentage of acreage in each region with the potential for ground water contamination was provided by Sobecki and Clipper (1999).

Frequency Factors: Ground Water Monitoring Operation and Maintenance

Region/Size	Sector			
	Swine	**Broiler**	**Layers**	**Turkeys**
MidWest/medium	72.54		72.54	72.54
MidWest/large	72.54			72.54
MidAtlantic/medium	76.09	76.09	76.09	76.09
MidAtlantic/large	76.09	76.09		76.09
South/medium		77.55	77.55	
South/large		77.55		

For swine, Midwest/medium <2,500 head, and MW/large ≥ 2,500 head; MA/medium <2,500 head, and MA/large ≥ 2,500 head.
For broilers, MA/medium = 300-1,000 AU and MA/large > 1,000 AU; SO/medium = 300-1,000 AU and SO/large > 1,000 AU.
For layers, no distinction is made between medium and large.
For turkeys, MW/medium = 300-1,000 AU and MW/large > 1,000 AU; MA/medium = 300-1,000 AU and MA/large > 1,000 AU.

5.5.3.5 Operation and Maintenance for Surface Water Monitoring

The initial assumptions used in developing cost estimates for surface water monitoring include 4 grab samples per sampling event, 12 sampling events per year, and analysis of each sample for nutrients, BOD_5, total suspended solids (TSS), and fecal coliform (FC). It is assumed that nutrient analyses would include nitrite+nitrate (NO_2 and NO_3), total Kjeldahl nitrogen (TKN), and total phosphorus (TP) and that each sampling event would include one additional quality assurance (QA) sample. The typical holding time for FC is 6 hours and the holding time for BOD_5 is 48 hours. Because it was assumed that sampling events would coincide with rain events rather than scheduling the sampling in advance, it was deemed unlikely that the results from FC and BOD_5 analysis would meet QA requirements unless provisions are made for rapid (and expensive) delivery of samples to a lab. Therefore, analysis for FC and BOD_5 was dropped from the monitoring requirements.

The estimated cost assumes that the operation would (1) purchase new containers for each sampling event, (2) take the samples, and (3) ship the samples to a laboratory for processing. Purchasing new (sterile) containers reduces the potential for sample contamination. Operator sampling is necessary because of the difficulty that a state agency or contractor would have in mobilizing for rain-based sampling events. Given the low annual laboratory through-put and the costs associated with certification and quality assurance, sending the samples to a laboratory

(rather than performing analysis on-site) for analysis appeared to be the most logistically viable alternative.

Sampling and analysis would follow typical surface water monitoring Standard Operating Procedures (SOPs), including appropriate chain of custody. Below are references and key highlights extracted from typical SOPs that affect applicability, logistics, and costs. The use of these SOPs provides the basis for cost calculations.

TSS http://www.epa.gov/reg5ocrl/sop/sopdoc/gc18.htm (STANDARD OPERATING PROCEDURE FOR THE ANALYSIS OF RESIDUE, NON-FILTERABLE (SUSPENDED SOLIDS) IN WATER METHOD 160.2 NS (GRAVIMETRIC, 103 - 105 °C)

- The method is approved for NPDES requirements for a range of 2 to 2000 mg/L (when a 100-mL sample is used).
- Samples are stored at 4°C.
- Samples are collected in glass or high-density polyethylene containers.
- The holding time is 7 days.

TKN & TP http://www.epa.gov/reg5ocrl/sop/sopdoc/gc032.htm (STANDARD OPERATING PROCEDURE FOR THE ANALYSIS OF TOTAL KJELDAHL NITROGEN AND TOTAL PHOSPHORUS IN WATER METHOD 351.2 *NS AND METHOD 365.4 *NS (COLORIMETRIC, SEMI AUTOMATED, BLOCK DIGESTOR, AA II)

- Analysis for these chemicals is normally run simultaneously. It is an approved alternate test procedure for NPDES. However, the approval applies only to analyses performed at the Central Regional Laboratory.
- The working range for TKN is approximately 0.1 to 10 mg N/L and for TP is approximately 0.05 to 5.0 mg P/L.
- Samples are collected in new 500-mL high-density polyethylene containers. Flexidome and phenolic resin (black) caps or caps with glued plastic liners might contaminate the samples and are not acceptable.
- Samples are preserved by acidification to pH < 2 with the addition of approximately 1 mL of concentrated H_2SO_4 per liter of sample.
- Samples are stored at 4°C.
- Samples are stable for at least 28 days.

Based on these SOPs, each grab sample would require one 500 mL sample for nitrate-nitrogen, total Kjeldahl nitrogen (TKN), and total phosphorus (TP) acidified with 1 mL concentrated sulfuric acid (H_2SO_4); and one 250 mL sample for TSS (unacidified). Analytical costs were obtained from New Mexico State University's Soil, Water, and Air Testing Laboratory (http://swatlab.nmsu.edu/wtrlist.htm and http://swatlab.nmsu.edu/bactlist.htm). The costs for NO_{23}, TKN, TP, and TSS were $16.50, $33.50, $5.00, and $16.00 per analysis, respectively.

(The sample for nutrients could also be used for NH_4 for an additional $20 per analysis, which is not included in this exercise.) This yields a total of $71.00 per sample.

In addition to analytical costs, annual costs include sample bottles, shipping, supplies and transportation, and labor for sample collection and data review. Sample bottle costs were obtained from the *1998 HACH Products for Analysis*; overnight shipping was based on a typical Federal Express standard overnight delivery of a 30-lb package; miscellaneous supplies include sterile pipet tips and H_2SO_4 for acidifying a portion of the samples; and transportation includes travel to readily accessible stream locations. It is assumed that the 4 grab samples and 1 QA sample can be collected within a 2-hour time period per sampling event and that all appropriate chain-of-custody, data review, and data recording can be completed within 1 hour per sampling event.

Table 5-3 provides a detailed estimate of annual costs for surface water sampling without BOD_5 and FC. The total annual cost for surface water sampling is $6,252 per year without BOD_5 and FC.

Table 5-3. Detailed Estimate of Annual Costs for Surface Water Sampling

Description	Unit Cost ($)	Annual Cost ($)
250-mL - bottles (2 bottles per sample)	2.00	240.00
500-mL - bottles (1 bottle per sample)	2.70	162.00
Overnight shipping (30 lb cooler)	60.00	720.00
Misc. supplies and transportation	30.00	30.00
Laboratory costs	79.00	4,740.00
Sample collection (2 hrs/sampling event)	10.00	240.00
QA & record keeping (1 hr/sampling event)	10.00	120.00
	TOTAL ANNUAL COST	6,252.00
Note: Assumes 12 sampling events per year, 4 grab plus 1 QA samples per event, for a total of 60 samples per year.		

The frequency factors for surface water monitoring at layer facilities were assumed to be zero, those for swine were based upon industry data (USDA APHIS, 1995), and those for broiler and turkey facilities were derived from an analysis of state regulations (Tetra Tech, 2000a). Refer to Section 5.5.1.4. for the table of frequency factors.

5.6 Facility Upgrades

Existing animal feeding operations might require special structures to be built or plans to be developed to reduce the potential for the introduction of nutrients or other harmful compounds into surface and ground water. This section describes the facility upgrades associated with swine and poultry operations and the estimates of their initial capital costs and any operation and

maintenance costs that were used to develop the costing model. Major facility upgrades consist of developing suitable storage for manure and disposal of animal mortalities and clean water diversions around storage structures, particularly as the upgrades are needed to control land application.

5.6.1 Fixed Costs

5.6.1.1 Mortality Composting Facility

Costs of constructing animal mortality facilities are related to the mortality rate of the various animals. Table 5-4 gives a summary of the mortality rate, average mortality weight, and the average length of animal confinement for different types of swine and poultry.

Table 5-4. Mortality Rate, Mortality Weight and Time to Maturity for Various Swine and Poultry Operations

Animal	Operation	Mortality Rate (percent)	Average Mortality Weight (pounds)	Time to Maturity (days)
Swine	Farrow to Finish	5	123	160
Swine	Finisher	5	110	123
Chicken	Layer	14	4	440
Chicken	Pullet	5	4.3	140
Chicken	Broiler	5	4.5	45
Chicken	Integrated Layer	13	4	395.5
Turkey	Hen	6	16	98
Turkey	Tom	9	25	133

Adapted from Carter et al., 1993, and USDA NRCS, 1998.
Note: Average mortality weight for broilers, hens, and toms do not reflect chick mortality.

The peak daily mortality was calculated by the equation:

DAILY MORTALITY WEIGHT = NUMBER OF ANIMALS X MORTALITY RATE X MORTALITY WEIGHT/TIME TO MATURITY

For example, a 25,000-bird tom turkey operation with a 9 percent mortality that markets 25-pound toms in 133 days (25,000 x 0.09 x 25/133) produces 423 pounds per day peak mortality. Carter et al. (1993) assumed that 2.0 ft^3 of composting space is required for each pound of dead animal. Thus the area required to compost the peak mortality of the flock (423 lb x 2.0 ft^3/lb) is 846 ft^3.

A safety factor (50 percent extra composting bin space) was included to account for additional mortalities. The safety factor effectively increases the composting space for each pound of dead animal to 3.0 ft^3 which compares favorably with the 2.5 ft^3 recommended by the Poultry Water Quality Consortium (1998a). In addition, the Poultry Water Quality Consortium recommends that composting of catastrophic event mortalities can be accomplished in the bedding or litter where the poultry were housed if the whole population is involved and adequate space and time are available. Using the example above (i.e., 846 ft^3 required at a peak mortality rate), the total volume for composting bins required (846 ft^3 x 1.50 safety factor) is 1,296 ft^3. Bins of

approximately 200 ft^3 in capacity (5 feet by 8 feet by 5 feet high) are suitable for animals weighing less than 300 pounds and allow entrance with a front-end loader (Brodie and Carr, 1997). Therefore, the number of bins required (1,296 ft^3 total/200 ft^3 bin size) is 6.48 (rounded to 6) bins.

According to Carter et al. (1993), the cost of a 25,000-bird tom turkey mortality composting facility is $3,500. Farm equipment is usually needed to carry dead animals and compost ingredients to the compost facility and to remove finished compost (Poultry Water Quality Consortium, 1998a). For this reason, a 20-foot concrete apron at the front end and bin side of the shed were added to accommodate mechanical turning and loading/unloading of the compost and litter. This increased the cost from $4.14/square foot to $7.50/square foot (NCSU, 1998). This $7.50/square foot cost was used for swine and poultry composting facilities assuming a 5-foot bin height. The cost of the composting facility can thus be summarized as follows:

Cost of compost facility = daily mortality weight x 2 x 1.5 x unit storage cost

EPA assumed all operations have adequate mortality handling practices to prevent mortality from being discharged directly into surface water. However, some handling methods may cause pollutants to discharge to groundwater, such as burial in areas with a high water table. These handling methods would need to be prevented if the operation has a direct hydrologic connection between the groundwater and surface water. For purposes of costing, EPA assumed mortality composting in covered and lined composting bins would be adopted as the mortality handling practice at those operations with the hydrologic connection. The frequency factors for mortality composting facilities were assumed to be the same as those calculated for facilities incurring the operation and maintenance of ground water monitoring (see Section 5.5).Thus, for all sectors the frequency factors are based on the percentage of acreage with potential for ground water contamination (see Table 5-5).

Frequency Factors: Mortality Composting and Operation and Maintenance

Region/Size	Sector			
	Swine	**Broiler**	**Layers**	**Turkeys**
MidWest/medium	72.54		72.54	72.54
MidWest/large	72.54			72.54
MidAtlantic/medium	76.09	76.09	76.09	76.09
MidAtlantic/large	76.09	76.09		76.09
South/medium		77.55	77.55	
South/large		77.55		

For swine, Midwest/medium <2,500 head, and MW/large ≥ 2,500 head; MA/medium <2,500 head, and MA/large ≥ 2,500 head.
For broilers, MA/medium = 300-1,000 AU and MA/large > 1,000 AU; SO/medium = 300-1,000 AU and SO/large > 1,000 AU.
For layers, no distinction is made between medium and large.
For turkeys, MW/medium = 300-1,000 AU and MW/large > 1,000 AU; MA/medium = 300-1,000 AU and MA/large > 1,000 AU.

5.6.1.2 Manure Storage (for Poultry Litter)

Requirements for poultry litter storage structures are similar to those for mortality composting facilities in that they require a roof, foundation and floor, and suitable building materials for side walls. The construction of poultry litter storage facilities includes a roof with a 0.75 pitch, a concrete floor 16 feet wide, and a 12-foot height from floor to roof (NCSU, 1998). The width and height were designed for piling manure to its angle of repose to minimize space. The length of the structure is variable.

The birds are reared on a floor that is covered with a bedding source, one to four inches deep, which can be wood shavings, rice hulls, chopped straw, peanut hulls, or other product depending upon geographical availability (NCSU, 1998). The bedding absorbs moisture and dilutes the manure produced by birds when it mixes.

The litter mixture is either removed after each flock or is used for a second flock with the exception that a small amount of litter as cake (compacted and concentrated manure/litter mix) is removed and the remaining litter is top dressed with an inch or so of new bedding material. When the house is totally cleaned out the litter is pushed to the center of the house and a front loader will place in it a litter spreader to be used as a nutrient source for crops. Complete cleaning of the house is one of the procedures followed to minimize transmission of diseases.

The size of a poultry manure storage facility was calculated based on the volume of both manure and litter produced from the various poultry operations. Manure production for all poultry types, when designing manure storage facilities, was assigned a value of 0.00169 ft^3 per bird per day (or 0.6169 ft^3 per bird per year) (NCSU, 1998).

Litter production was calculated as the number of houses (25,000 chickens or 6,250 turkeys per house) multiplied by the shaving material application depth (3.0 inches), multiplied by the area of the house (16,000 ft^2), adjusted for the amount of house floor area to receive shavings (zero percent for layers, 33 percent for pullets, and 100 percent for the remaining poultry types), and multiplied by the frequency of litter storage emptying (no more than two times per year).

The volumes of manure and litter production were summed to arrive at the total volume required for the manure storage facility. The square footage of the storage facility was calculated based on a 4-foot waste depth and multiplied by $7.50 per square foot (the NCSU rate for construction of a litter storage shed) to develop a capital cost estimate for a poultry litter storage shed. The 4-foot waste depth is consistent with recommendations that stacks should not exceed 5 to 8 feet in height to prevent excessive heating and spontaneous combustion of wastes (Poultry Water Quality Consortium, 1998b). The following is an example demonstrating these calculations:

> A 25,000-bird tom turkey operation would produce 8,000 ft^3 of litter every 6 months (25,000 birds x 0.25 ft of litter depth x 16,000 ft^2 per house ÷ 6,250 birds per house x 100 percent of the housing floor covered ÷ 2 storage periods per year). It would also produce 7,711 ft^3 of manure every 6 months (25,000 birds x 0.00169 ft^3 of manure per bird per day x 365 days per year ÷ 2 storage periods per year). Therefore, the storage facility would require a total of 15,711 ft^3 of waste storage capacity, or 3,928 ft^2 of storage structure (at an average storage depth of 4 ft). The total cost of the storage structure for this facility is $29,457 per 6-month storage facility (3,928 ft^2 x $7.50 per ft^2).

The frequency factors for spreader calibration at layer facilities were based upon industry data (UEP/UEA, 1999) and those for broiler and turkey facilities were derived from an analysis of state regulations (Tetra Tech, 2000a).

Frequency Factors: Manure Storage

Region/Size	Sector		
	Broiler	**Layers**	**Turkeys**
MidWest/medium		30	25
MidWest/large			25
MidAtlantic/medium	30	30	75
MidAtlantic/large	30		75
South/medium	30	30	
South/large	30		

For broilers, MA/medium = 300-1,000 AU and MA/large > 1,000 AU; SO/medium = 300-1,000 AU and SO/large > 1,000 AU.
For layers, no distinction is made between medium and large.
For turkeys, MW/medium = 300-1,000 AU and MW/large > 1,000 AU; MA/medium = 300-1,000 AU and MA/large > 1,000 AU.

5.6.1.3 Lagoon Liners

Only those operations with a positive assessment of the feedlot/groundwater link to surface water, as described in 5.5.1.3, will need lagoon liners. First it is necessary to estimate the percentage of operations likely to have a positive determination of this hydrologic link to groundwater. Positive hydrologic links were assumed to exist at all operations sited on land with a high potential for groundwater discharges to surface water. The acreage in each region with potential limitations regarding ground water contamination was provided by Sobecki and Clipper (1999). This percentage was calculated in the following manner:

1. The acreage with potential for siting animal waste treatment, storage, or handling facilities in each region (Central, Mid-Atlantic, Midwest, Pacific, and South) was determined for each region using 1992 National Resources Inventory (NRI) data.
2. The potential siting acreage was further characterized by the existence of physical soil and landscape factors that impart a potential for ground water contamination. These factors are sandy soils, high ground water table (within 6 feet of surface), and karst topography. The acreage characterized by any combination of these factors was summed for each region.
3. The total acreage for each region from step 2 was divided by the acreage in step 1 and then multiplied by 100 to calculate the percentage of acreage with potential for ground water contamination in each region.

The frequency factor for ground water monitoring wells and their operation and maintenance was calculated as 100 minus the percentage of acreage with potential for ground water contamination (Table 5-5) because this percentage would not be subject to ground water monitoring requirements if imposed. Frequency factors for lagoon liners and for mortality composting facilities and their operation and maintenance were set equal to the ground water monitoring frequencies because they apply only to the ground water costing option. Assessment of the ground water link to surface water would have to be performed by all facilities, however, so that frequency was set at zero.

Table 5-5. Acreage with Potential for Ground Water Contamination

CAFO Region	Percentage	100-Percentage
Mid-Atlantic	23.91	76.09
South	22.45	77.55
Midwest	27.46	72.54
Central	12.60	87.40
Pacific	12.28	87.72
Total (U.S.)	22.86	77.14

Source: Sobecki and Clipper, 1999

According to the American Society of Agricultural Engineers standards (ASAE, 1998), a minimum lagoon depth of 5 feet is necessary for construction of anaerobic lagoons. Midwest Plan Service (MWPS , 1993) used a range of lagoon depths from 8 to 25 feet. With the large variability in lagoon depths, a value of 12 feet was selected for this analysis to represent all lagoons. The side slopes for lagoons were assumed to be 2:1 (horizontal:vertical) (MWPS, 1993, and ASAE, 1998), and the lagoon shape was assumed to be square. The interior square footage, including the side slopes, was used to calculate the required liner area for the earthen lagoon.

Several lagoon liner manufacturers were contacted to identify costs of purchasing and installing lagoon liners. The results of the survey are shown in Table 5-6. The top two costs in Table 5-10 reflect differences in materials and do not include installation. Installed lagoon liners range from $1.28 to $4.00 per square foot, with lower costs per square foot expected at larger installations. Thus, to develop costs for installation of lagoon liners, a cost of $1.50 per square foot was assumed. The clay used to develop the original lagoon would be used to line the walls and bottom in addition to the synthetic liner. This is expected to help protect the synthetic liner from accidental tearing by heavy equipment during lagoon cleanouts.

Industry communications indicate old lagoons are typically not retrofit with liners (Tetra Tech, 1999). Instead, the old lagoon is cleaned out and closed at a cost of $0.31 per gallon (NCDENR, 1999), a new lagoon is constructed, and is fit with a liner. EPA chose to cost for the construction of a new lagoon to comply with the requirements of Option 3. EPA believes the cost of a new

and properly constructed lagoon with a liner is not likely to cost more than emptying an existing lagoon to retrofit the liner.

Table 5-6. Manufacturer-Suggested Costs of Lagoon Liners and Covers for ½-Acre Lagoons

Dealer	Description	Cost
Environmental Protection, Inc.	30-mil PVC liner	$0.25/ft^2
Environmental Fabrics, Inc	½ acre lagoon, 40-mil HDPE liner	$0.55/ft^2
Lange Containment Systems, Inc.	30 mil PVC liner, 36 mil reinforced Hypalon cover system	$1.28/ft^2
	installation	$34,665
CW Neal	½-acre lagoon, 32-mil polypropylene, installed	$3-4/ft^2
Environmental Fabrics, Inc.	½-acre lagoon, 40 mil HDPE uninsulated cover, gas, and rain collection	$0.85/ft^2
	½-acre lagoon, 40 mil HPDE R-6 insulated cover, gas, and rain collection	$2.25/ft^2
Reef Industries	Permalon®, ply X-210 reinforced floating cover system (not including foam float logs)	$0.40/ft^2
Geomembrane Technologies, Inc.	½-acre cover system installed, 30 mil reinforced modified PVC layer (XR-5) and ½-inch sublayer	$105,000
Environmental Protection Inc.	36 mil reinforced cover	$0.45 - $0.50/ft^2

The frequency factors for lagoon liners for all sectors were assumed to be the same as those calculated for the operation and maintenance of ground water monitoring (see Section 5.5), and were calculated as 100 minus the percentage of acreage with potential for ground water contamination (see Table 5-5). The percentage of acreage in each region with the potential for ground water contamination was provided by Sobecki and Clipper (1999).

Frequency Factors: Lagoon Liners and Operation and Maintenance (Wet Systems)

Region/Size	Sector	
	Swine	Layers
MidWest/medium	72.54	72.54
MidWest/large	72.54	
MidAtlantic/medium	76.09	76.09
MidAtlantic/large	76.09	
South/medium		77.55
South/large		
For swine, Midwest/medium <2,500 head, and MW/large ≥ 2,500 head; MA/medium <2,500 head, and MA/large ≥ 2,500 head. For layers, no distinction is made between medium and large.		

5.6.1.4 Lagoon Covers

According to the American Society of Agricultural Engineers standards (ASAE, 1998), a minimum lagoon depth of 5 feet is necessary for construction of anaerobic lagoons. Approximately 20 feet is considered the maximum depth to ensure proper biological activity. For this analysis 12 feet was selected as the maximum depth of all lagoons. The side slopes for lagoons were assumed to be 2:1 (horizontal to vertical) (MWPS, 1993, and ASAE, 1998), and the lagoon shape was assumed to be square. The surface square footage was then calculated to determine the costs of a lagoon cover.

Several lagoon cover manufacturers were contacted to identify costs of purchasing and installing lagoon covers. The results of the survey are shown in Table 5-6. Installed lagoon covers range from $1.20 to $4.81 per square foot, with lower costs per square foot expected at larger installations and depending whether insulation is required. Thus, to develop costs for installation of insulated lagoon covers, a cost of $4.00 per square foot was assumed.

Frequency Factors: According to USDA NAHMS (1999) few swine lagoon have covers. Frequency factors for covering lagoons was thus conservatively set at zero.

5.6.1.5 Lagoon Depth Marker

All facilities require some sort of gauge to measure the depth of the liquid impoundments. A lagoon depth marker can be manufactured by purchasing PVC pipe, fittings, and cement to construct a length of incrementally marked pipe long enough to reach the bottom of the lagoon

and extend above the freeboard. A cost of $30 was used as the estimated cost of building and installing a lagoon depth marker.

The frequency factors for lagoon depth markers at swine facilities were based upon the AFO Strategy (USEPA, 1999b). It was assumed that no layer facilities had lagoon depth markers, and dry manure facilities do not need depth markers.

Frequency Factors: Lagoon Depth Marker

Region/Size	Sector	
	Swine	Layers
MidWest/medium	0	0
MidWest/large	99	
MidAtlantic/medium	0	0
MidAtlantic/large	99	
South/medium		0
South/large		
For swine, Midwest/medium <2,500 head, and MW/large ≥ 2,500 head; MA/medium <2,500 head, and MA/large ≥ 2,500 head. For layers, no distinction is made between medium and large.		

5.6.1.6 Anaerobic Digesters

Many livestock facilities handle manure as liquids and slurries. Anaerobic decomposition of the stored manure produces large volumes of biogas, which contains 60-80% methane. The digesters capital costs are usually high, but the overall costs of digesters should consider the potential for biogas generation to offset on-farm costs. The digester reduces offensive odors (volatile organic acids), BOD (biochemical oxygen demand), surface and groundwater contamination, greenhouse gases, and produces a stabilized biomass. Changes to the form of nutrients may occur, but the mass of nitrogen and phosphorus is assumed to be conserved. Additionally, total coliform reductions of up to 90% occur in the selective environment of an anaerobic digester (AgSTAR). Though odor complaints from neighbors are likely to be reduced, EPA did not cost the value of reduced odors and subsequent reduced complaints to the facility.

The covered lagoon / methane recovery system has reduced effectiveness in the colder/northern climates. Experience shows it is unlikely a covered lagoon digester will pay for itself in the northern part of the country. However, there are other effective forms of digestion more appropriate for the north such as complete mix and plug flow type designs, especially when heat recovery is used to maintain digester temperatures. These alternate designs are also more

appropriate for facilities with higher total solids manure contents such as pull plug pits and certain under house pit facilities. In addition to covered anaerobic lagoons, which are the costs presented in the cost model outputs, EPA evaluated costs for a newly constructed methane recovery lagoon, both with and without covers on the second lagoon (for effluent storage), and both with and without liners. EPA also evaluated complete mix heated (mesophilic) digesters, with and without pasteurization after digestion. EPA did

Farmware and the AgSTAR program was designed as a decision making tool to encourage biogas recovery system development at livestock facilities. Feasability assessment is performed by inputting site specific parameters in the Farmware program. The costs were obtained from Farmware (AgSTAR), site visits (see record), the literature, and through personal communications (K. Roos; M. Moser). Biogas production, equipment design and sizing, and respective costs were obtained using the Farmware program (Agstar) using the following parameters to represent the model farm:

- use Sampson County, North Carolina as the representative MidAtlantic farm, and Blue Earth, Minnesota as the Midwest farm. Boone, Iowa parameters were also used as the Midwest farm, but the higher costs obtained using Minnesota as the representative farm was kept as the more conservative cost estimate
- assume “flush everything” as the existing manure management system
- reduce flush water to twice per day where appropriate to reduce digester size and costs (33% reduction in flush water use)
- additional fresh process water results from cleaning and spilled drinking water only; precipitation is diverted away from the digester, but not the effluent storage lagoon
- use model default of $.06 per kWh (1999 U.S. average of 4.5 cents industrial use, 7.43 cents commercial, and 8.27 cents residential)
- assume engine overhaul every 5 years at $5000
- assume 0.005 ft3/lb VS sludge buildup every 5 years is removed from the treatment cell
- EPA used the more current lagoon construction and cover costs data described in section 5.6.1.4.
- assume 15% of capital in contingency for site specific factors related to engineering and design

The Farmware program estimates electrical and propane uses that may be offset by biogas recovery and use. No sales of excess power produced during peak times was considered in this analysis. The generator was oversized by ~10 kW to reduce equipment corrosion occurring due to sulfide production. Modern heat boilers can replace the generator / engine costs specified by the program, and cost $7000 less. Engine overhaul was assumed to occur every 5 years as a preventative maintenance. Engineering costs of $25 thousand (Farmware model default) was used for grow-finish facilities. Engineering costs for farrow-to-finish operations were increased to $40 thousand to account for the increased complexity of the site that could affect digester construction and design.

Based on 20% P concentration in the digester, fewer truck trips will be needed to haul excess phosphorus. The biomass has 37% TS, thus hauling costs were assumed to be reduced by 63% to account for fewer truck trips. All sludge hauling was costed as a every five year expense, though in practice hauling may occur anywhere from every seven years to more than 20 years between lagoon cleanouts. This provided a quick estimate of the offset hauling costs, and is reflected by reduced hauling costs in the cost model. Lagoon water is assumed to be used for flush water, though some facilities may elect to irrigate cropland with the water.

Where appropriate, the existing lagoon at a facility was assumed to be used as the storage cell for recycled flush water. Deep pit housing systems do not use a storage lagoon, so additional capital costs will be on the order of $30-50 thousand, for an additional estimated $4500 annual expense. Such facilities may benefit from biogas collection, but biogas collection will not be economically viable at these sites in the form of a covered lagoon digester.

The costs developed for the representative farm were compared to progress reports developed for the AgStar program. EPA's Office of Air and Radiation has additional data concerning performance and costs for liners, covers, and lagoon construction. These costs are comparable to the default costs in Farmware, but may not address all costs needed at a given farm. For purposes of determining economic viability, the parameters driving annualized costs are the operational costs and cost offsets; it is therefore unlikely the capital cost estimates will have any noticeable affect on annual costs calculated by the cost model.

As an alternative to covered lagoon digesters, costs were developed for a complete mix digester for all "large" swine model farms. A complete mix digester is a heated, constant volume, mechanically-mixed tank with a gas-tight collection cover. Manure waste is preheated in a small mix tank, and added daily to feed the digester, where it is intermittently mixed to prevent formation of a crust and to keep solids in suspension. Average manure retention times range from 15 to 20 days. The gas-tight cover maintains anaerobic conditions inside the tank and collects the biogas through attached pipes. The heat generated by burning the collected biogas is used to heat the digester. EPA analysis indicates this form of digesters is likely to result in overall negative annualized costs (i.e. the facility earns profits) for the largest facilities, but success of the digester depends heavily on proper engineering design, digester management, and management of process water to maintain at least 2% total solids in the digester feedstream. Reduction of HRT to 15 days and water management reduce the capital costs of the digester considerably.

Frequency Factors:
In 1998 there were about 94 digesters that were installed or were planned for working dairy, swine, and caged-layer poultry operations in the United States (Lusk, 1998). Of these 94 digesters, more than 60% of plug flow and complete mix digesters and 12% of the covered lagoon digesters have failed (Lusk, 1998). Many of these failures were of systems constructed prior to 1984; since that time, more simplified digester designs have been implemented which have greatly improved reliability. For purposes of costing Option 6, it is assumed that no large swine facilities currently operate a digester with energy recovery. For Option 6, the largest swine

farms were assessed the incremental costs of designing, installing, and operating a covered lagoon type digester as described above. Digesters are also costed for medium sized swine operations for use in Option 5.

5.6.1.7 High Rise Hog Facility Upgrades

Menke et al. (2000) evaluated the construction costs for a two-story confinement housing design. The animals are kept on slatted floors in the upper level, similar to a traditional flush house. The lower level is a concrete floored pit where the manure falls onto drying material such as shavings, peanut hulls, or corn stalks. Air is blown up through the bottom floor to assist drying the manure, and ventilation is pulled down over the animals. Higher building costs, operation costs, and ventilation costs are reportedly offset by improved animal health, increased animal performance, decreased hauling costs, and the savings of not needing a lagoon or other liquid impoundment.

A highrise house for 1,000 head of finishing pigs is approximately 44 ft x 190 ft. On a per pig basis, a traditional deep pit house in Indiana/Ohio costs $155-160 per animal; a lagoon style flush house costs $145 per animal (plus lagoon costs); the highrise building costs $185 per animal. The highrise building costs include professional engineering design that meets NRCS design standards. Building a deep pit house to these standard was estimated to increase the construction cost of a deep pit house by $15,000 ($15 per animal).

Frequency Factors: Only a few highrise hog facilities are in the testing, evaluation, and demonstration status phases. Thus, the frequency of compliance for highrise facilities is zero.

5.6.1.8 Storm Water Diversions

Runoff can enter lagoons and poultry storage facilities if it is not diverted. To prevent runoff from entering manure storage facilities, storm water can be diverted by constructing berms on two sides up-gradient of the storage facility or lagoon. ASAE (1998) specifies a berm with a 1-foot top width that is 3 feet high and has a 2:1 slope. Costs of land moving to establish a berm around two sides of the manure storage structure were derived from North Carolina agricultural cost share information as $2.60 per cubic foot. The cross-sectional area was calculated based on the berm characteristics and then multiplied by the length of the storage structure (plus on additional 10 feet on each side as a margin of safety) to obtain the cubic yardage for construction.

The frequency factors for storm water diversions at layer facilities (UEP/UEA) were based upon industry data, those for swine facilities were based upon site visits, and those for broiler and turkey facilities were derived from an analysis of state regulations (Tetra Tech, 2000a).

Frequency Factors: Storm Water Diversions and Operation and Maintenance

Region/Size	Sector			
	Swine	**Broiler**	**Layers**	**Turkeys**
MidWest/medium	72.54		80.9	0
MidWest/large	72.54			0
MidAtlantic/medium	76.09	0	69.3	0
MidAtlantic/large	76.09	0		0
South/medium		0	70	
South/large		23.1		

For swine, Midwest/medium <2,500 head, and MW/large ≥ 2,500 head; MA/medium <2,500 head, and MA/large ≥ 2,500 head.
For broilers, MA/medium = 300-1,000 AU and MA/large > 1,000 AU; SO/medium = 300-1,000 AU and SO/large > 1,000 AU.
For layers, no distinction is made between medium and large.
For turkeys, MW/medium = 300-1,000 AU and MW/large > 1,000 AU; MA/medium = 300-1,000 AU and MA/large > 1,000 AU.

5.6.1.9 Field Runoff Control

Runoff control for fields used for manure application can be achieved by creating buffer strips along the fields adjacent to streams. The ratio of stream length to land area was calculated based on national estimates of land area (3 million square miles of land in the contiguous United States [ESRI,1998]) and stream miles (3.5 million miles of streams [USEPA, 2000]). This ratio was converted to miles per acre (0.00144 mile of stream per acre of land). The amount of land needed for buffer construction was then calculated by multiplying the average acres of cropland for each model farm by the ratio of stream miles per acre of land. This produced the length of stream on each farm. It was further assumed that the farm was square and the stream ran down the middle of the farm. The width of the buffer (on both sides of the stream) was assumed to be 100 feet. The costs of 100 feet buffers was based on information collected from a total of 914 filter strip projects in 28 states with an average cost of $106.62/ac (1999 dollars; USEPA, 1993). The net loss of tillable land for establishment of a buffer was estimated at 3.5 percent of the cropland (0.00144 mile of stream per acre x 5,280 feet per mile, x 200 ft^2 of buffer per foot of stream length ÷ 43,560 ft^2/ac). Thus, the cost for field erosion control was estimated at approximately $3.72/ac of total cropland.

In lieu of the buffer, EPA also considered: 1) establishing a 100 foot setback instead of the buffer, and 2) using the costs of the buffer as an allowance for the CAFO to implement site

specific field control practices such as conservation management. In other words, controls other than buffer strips may be more effective in certain situations (Sims, 2000), and the $3.72/ac cost basis is considered an allowance that can be used to implement other runoff control practices. A sensitivity analysis of the assumptions used to estimate stream length to land area ratios and the amount of land costed to be taken out of production is in the record (Tetra Tech, 2000b). Pollutant removal efficiencies are presented in Table 5-7.

The frequency factors for stream buffers at layer facilities were based upon industry data (UEP/UEA, 1999), those for swine facilities were based upon site visits and state regulations, and those for broiler and turkey facilities were derived from an analysis of state regulations (Tetra Tech, 2000a).

Table 5-7. Pollutant Removal Efficiencies for Vegetated Buffers

Buffer Width	Sediment Removal (%)	Phosphorus Removal (%)†	Nitrogen Removal (%)†
35-Foot Buffer	80	80	75
65-Foot Buffer	85	85	80
100-Foot Buffer	88	88	85

†Decrease by 10 percent for slopes greater than 3.5%

Frequency Factors: Stream Buffer and Operation and Maintenance

Region/Size	Sector			
	Swine	Broiler	Layers	Turkeys
MidWest/medium	0		80.9	0
MidWest/large	99			0
MidAtlantic/medium	0	0	69.3	0
MidAtlantic/large	99	0		0
South/medium		0	70	
South/large		0		

For swine, Midwest/medium <2,500 head, and MW/large ≥ 2,500 head; MA/medium <2,500 head, and MA/large ≥ 2,500 head.
For broilers, MA/medium = 300-1,000 AU and MA/large > 1,000 AU; SO/medium = 300-1,000 AU and SO/large > 1,000 AU.
For layers, no distinction is made between medium and large.
For turkeys, MW/medium = 300-1,000 AU and MW/large > 1,000 AU; MA/medium = 300-1,000 AU and MA/large > 1,000 AU.

5.6.2 Annual and Reoccurring Costs

All of the fixed costs mentioned previously are associated with annual costs for operation and maintenance. Standard operation and maintenance is about 2 percent of the capital cost of each facility (NCSU, 1998).

5.6.2.1 Visual Inspection

Weekly visual inspections ensure that the facility components likely to contribute to surface or ground water quality impairments are all functioning properly. This includes routine inspections around the production area to ensure that automated watering lines are functioning properly and inspection of manure level for liquid systems to ensure that there is no threat of potential discharge. Visual inspection requires only a short time to walk around the building and storage facilities. It was assumed that there would be no cost for daily inspection of automated systems providing water to the animals since it is part of routine facility management and operations. Fifteen minutes weekly was assumed sufficient to accomplish this task. At a labor rate of $10/hr, the cost of annual visual inspections was estimated at $130/yr.

The frequency factors for visual inspection at layer and swine facilities were based upon the AFO Strategy (USEPA, 1999b), while the frequency factors for broiler and turkey facilities were derived from an analysis of state regulations (Tetra Tech, 2000a).

Frequency Factors: Visual Inspection

Region/Size	Sector			
	Swine	Broiler	Layers	Turkeys
MidWest/medium	0		25	0
MidWest/large	25			0
MidAtlantic/medium	0	0	25	0
MidAtlantic/large	25	0		0
South/medium		0	25	
South/large		23.1		

For swine, Midwest/medium <2,500 head, and MW/large ≥ 2,500 head; MA/medium <2,500 head, and MA/large ≥ 2,500 head.
For broilers, MA/medium = 300-1,000 AU and MA/large > 1,000 AU; SO/medium = 300-1,000 AU and SO/large > 1,000 AU.
For layers, no distinction is made between medium and large.
For turkeys, MW/medium = 300-1,000 AU and MW/large > 1,000 AU; MA/medium = 300-1,000 AU and MA/large > 1,000 AU.

5.6.2.2 Mortality Composting Facility

Mortality composting facilities have annual charges for standard operation and maintenance, including a cost for carbon sources for layer and hog operations. It was assumed that litter provide sufficient quantities of carbon, so no cost was added for carbon sources at broiler and turkey facilities. Mortality composting facilities also require other activities such as mortality transportation, loading into compost bins, and turning the partially composted materials. The annual labor requirement is estimated at 90 hours (1.75 hr/wk) for a single worker with a tractor ($10/hr for labor and $30/hr for the tractor) (NCSU, 1998). The rental value for land taken out of production to construct the mortality facility was not assessed. Facilities were assumed to be constructed adjacent to storage areas.

Frequency Factors:
The frequency factors for operation and maintenance of mortality composting facilities were assumed to be equal to those for construction of the facilities. See Section 5.6.1.2 for details.

5.6.2.3 Lagoon Liners

Lagoon liners may require higher operation and maintenance than the standard 2 percent of initial cost used for other practices. One problem includes tearing of the plastic liner during sludge cleanout. Thus, the operation and maintenance of a lagoon liner was set at 5 percent of initial costs.

Frequency Factors:
The frequency factors for operation and maintenance of lagoon liners were assumed to be equal to those for initial implementation of the controls. See Section 5.6.1.3 for details.

5.6.2.4 Lagoon Covers

Operation and maintenance costs for lagoon liners were estimated at 2 percent of initial costs.

Frequency Factors:
According to USDA NAHMS (1999), few swine lagoon have covers. The frequency factors for covered lagoons was thus conservatively set to zero.

5.6.2.5 Anaerobic Digesters

Operation and maintenance costs are calculated by the Farmware program as a function of the generator size (i.e. dollars per kW). These costs may be partially offset by savings of electricity and propane. Costs are also incurred for periodic engine overhaul, and for sludge cleanout.

Frequency Factors:
As described in 5.6.1.6, few digesters were assumed to exist, and the frequency factor is zero.

5.6.2.6 High Rise Hog Facility

Operation and maintenance costs for a highrise hog facility were estimated at 2 percent of initial costs. Additional costs include energy costs and drying agents. Energy costs for a traditional confinement building are estimated at $2,500 to $2,800 per year. The highrise building has average monthly costs of approximately $400 or $4,800 annually. Drying agents evaluated include wheat straw, corn stalks, and wood shavings. Around 50 to 60 tons of wood shavings are needed to start the house with two feet depth of material at an annual cost of $4,000 to $5,000 per year. In contrast, five feet of straw or corn stalk material are needed to absorb similar amounts of moisture. Even at a lower costs of $9 to $10 per 1,200 pound bale of corn stalks, the higher volumes to be handled offset the cost savings. Straw and corn materials also tend to degrade and compost more rapidly than wood requiring more frequent addition of drying material to the house.

Frequency Factors:
Only one highrise hog facility exists and is in the testing and evaluation state. Thus, the frequency of compliance for highrise facilities is zero.

5.6.2.7 Field Runoff Control

For field runoff control, the land taken out of production for installation of buffer strips was assumed to have been previously farmed. The rental value for land taken out of production was added to standard operation and maintenance charges. The rental value for cropland was estimated at $64.00/ac/yr based on analysis by North Carolina State University (NCSU, 1998).

Frequency Factors:
The frequency factors for operation and maintenance of field runoff controls were assumed to be equal to those for initial implementation of the controls. See Section 5.6.1.8 for details.

5.7 Land Application

This section describes the basis for costs of the land application component of nutrient management. The costs described in this section only address the costs for irrigation of liquids, and the incremental costs of incorporation or injection. Note these costs were not included in the final model facility costs as there are no standards in the proposed regulatory options that would require injection or incorporation. Hauling costs are addressed in Section 5.8.

Crop nitrogen and phosphorus requirements were calculated to depict conditions of each model farm. Extension personnel from counties with the densest populations of animals were consulted to determine the common cropping practices for all regions and sectors. Although the cost model is only run on two principle regions for each sector, all regions are presented in the analysis of crop nutrient requirements.

County Extension personnel identified the typical crop rotation for each sector (Table 5-8). Crop yields were determined by dividing the harvested quantity by the acreage obtained in the 1997 Census of Agriculture (USDA NASS, 1999). Occasionally, yields were far below expected yields and were changed to reflect expected yields found in the Ag Waste Management Field Handbook (AWMFH, USDA, 1992). Crop nutrient removal was based on Appendix I, Table A-1, Nutrient Content Values, for the major crops (USDA NRCS, 1998). The nitrogen application rates was increased to reflect a 30 percent loss of nitrogen after land application of manure (Sutton et al., 1985) primarily due to volatilization of ammonia.

Table 5-8. Crop Yields, Nutrient Removal and Application Rates (lbs/ac) from the Ag Waste Management Field Handbook (AWMFH) for Typical Crops used on Swine and Poultry Operations in the various Regions.

Sector	Region	Crop	Yield†	Census Yield	Yield Unit	Nitrogen Removal	Phosphorus Removal	Nitrogen Application	Phosphorus Application
Swine	CE	Corn	162	162	Bushels/acre	129	24	185	24
	MA	Corn	83	83	Bushels/acre	67	12	95	12
		Soybean	28	28	Bushels/acre	100	10	143	10
		Rye	25	25	Bushels/acre	26	4	38	4
	MW	Corn	135	135	Bushels/acre	108	20	154	20
		Soybean	48	48	Bushels/acre	170	17	242	17
	PA	Corn chop	23	23	Tons/acre	160	24	228	24
		Oats	90	90	Bushels/acre	53	10	76	10
		Alfalfa	7	7	Tons/acre	356	33	509	33
	SO	Bermuda	8	3	Tons/acre	150	15	215	15
Poultry	CE	Bermuda	8	4	Tons/acre	150	15	215	15
	MA	Corn	123	123	Bushels/acre	98	18	140	18
		Soybean	27	27	Bushels/acre	94	10	135	10
		Wheat	63	63	Bushels/acre	64	13	91	13
	MW	Fescue	5	3	Tons/acre	99	10	141	10
	PA	Corn chop	23	23	Tons/acre	165	24	236	24
		Oats	102	102	Bushels/acre	60	11	86	11
		Alfalfa	7	7	Tons/acre	352	33	503	33
	SO	Fescue	5	4	Tons/acre	99	10	141	10

† Yields were taken from the 1997 Census of Agriculture. The census combined information for the specific grass varieties (e.g. fescue and bermudagrass) occasionally resulting in lower yields when compared to AWMFH. Where sizeable discrepancies were identified (Swine, SO; Poultry, CE, MW, SO) AWMFH yields were used instead of census yields.

The average annual nitrogen and phosphorus crop removal and application rates were calculated by dividing the total crop requirements over the time to complete a full crop rotation (Table 5.9).

Table 5-9. Comparison of Nutrient Removal and Application Rates (lbs/ac) from the 1997 Census of Agriculture with County Extension Values or using 24 Crops and Pastureland Information in the Census.

Sector	Crops†	Region	Nitrogen Removal	Phosphorus Removal	Nitrogen Application	Phosphorus Application
Swine	corn	CE	129	24	*185*	*24*
Swine	c/sb/rye	MA	97	14	*138*	*14*
Swine	c/sb	MW	139	19	*198*	*19*
Swine	c/o/al	PA	178	18	*407*	*34*
Swine	bermuda	SO	150	15	*215*	*15*
Poultry	bermuda	CE	150	15	*215*	*15*
Poultry	c/sb/wt	MA	128	20	*183*	*20*
Poultry	fescue	MW	99	10	*141*	*10*
Poultry	c/o/al	PA	141	14	*412*	*34*
Poultry	fescue	SO	99	10	*141*	*10*

† Cropping system abbreviations: c, corn; sb, soybean; wt, wheat; o, oats; al, alfalfa. Bermuda and fescue refer to the typical hay crop.

It was assumed that the costs of transportation for land application of manure on the farm's crop land were already incurred by the operation. Thus, no costs were added for transporting manure from storage to the field for land application. It was also assumed category 3 farms (i.e. farms with no major cropland or pastureland, see Section 4.2.4) already haul manure to offsite recipients. Hauling distances and costs are derived in Section 5.9.3 and Appendix E.

5.7.1 Surface Application with Incorporation

Because it was assumed that animal feeding operations already have a mechanism to surface-apply manure, the only additional costs they would incur would be for incorporation. Disk harrows used for incorporation range in price from $5,600 to $34,000 (Lazarus, 1999) depending on their size and functionality. The average capital cost for disk harrows was assumed to be $20,000 (rounded up from $19,800) for the purpose of this model. Operating costs were calculated by Lazarus (1999) and assume that operations already have a tractor to pull the disk harrow. Annual operation and maintenance costs were estimated to be 2 percent of the capital cost ($400 annually) plus an additional $30/hr for tractor operation and $10/hr for labor. It is estimated that disking requires an additional 15 minutes/ac (0.25 hour more than surface application), yielding an operating cost of $10/ac of tillable land.

Incorporation by disking is the only option for land application of dry poultry manure. Incorporating semisolid or liquid manure with a disk was costed in the model, but it was always found to be more expensive than injection.

5.7.2 Injection of Semisolid or Liquid Manure

The assumptions used in preparation for developing costs of injection of nonsolid manure include the availability of a tank or suitable spreader and a tractor with sufficient power to pull it. USEPA (1998) reported that the cost of a 4,200-gallon tank with injectors had a capital cost of about $20,000. Wright (1997) reported that tanker spreaders without injectors cost between $9,000 and $18,500, depending on the size; a 4,500-gallon tanker costs $14,000. Using the difference between Wright ($14,000) and USEPA ($20,000), equipping a tanker with suitable connections for manure injection would cost approximately $6,000. Additionally, 2 percent of the capital cost is estimated for annual operation and maintenance costs ($120). No additional labor is required for manure injection because it is similar in level of effort to manure spraying.

5.7.3 Irrigation of Liquid Manure

Irrigation of liquid manure is the most costly application method in terms of initial capital costs. USEPA (1998) reported that the cost of a center pivot irrigation device capable of manure application on 150 acres was nearly $65,000. Two percent of this capital cost is estimated for annual operation and maintenance ($1,300). However, many operations already have the capability to apply manure through a center pivot or other irrigation device. For these operations there would be no additional cost.

Large operations producing liquid manure might require more than one center pivot irrigation device. For these operations, the amount of land available for land application (tillable acreage) was divided by 150 acres per center pivot to calculate the required number of center pivots.

5.8 Feeding Strategies to Reduce Excess Nutrients

Reducing the nutrients that are produced at the facility allows more manure to be applied to the land. This results in a decrease in the amount of nutrients and money required to transport excess manure off-farm. Reducing phosphorus in manure makes it a more balanced fertilizer in terms of plant requirements, which reduces excess application rates and their associated runoff into surface waters.

One way to reduce nitrogen and phosphorus is to reduce the quantity of nutrients in the excreta. Dietary strategies designed to reduce nitrogen and phosphorus include enhancing the digestibility of feed ingredients, genetic enhancement of cereal grains and other ingredients that results in increased feed digestibility, more precise diet formulation, and improved quality control. Although nitrogen and phosphorus are currently the focus of attention, these strategies also have the potential to decrease other nutrients.

The cost for feeding strategy implementation is based on the nutrient management basis (phosphorus- or nitrogen-based), which determines the implementation cost per animal. These costs are derived below. To obtain an annual cost for feeding strategy implementation, the cost

per animal was multiplied by the number of animals on the farm and the number of production cycles per year (Table 5-10).

Table 5-10. Number of Production Cycles per Year for Each Animal Operation

Type of Animal	Production Cycles per Year
Grower-Finisher	2.8
Farrow-to-Finish	2.1
Breeder	2.1
Layer	1.0
Broiler	5.5
Integrated Layer	1.0
Turkey Hen	3.1
Turkey for Slaughter	2.5
Integrated Turkey	3.0

The frequency factors for feeding strategies at swine facilities were based upon USDA data (USDA APHIS, 1995), while the frequency factors for broiler and turkey facilities were provided by site visits and conversations with industry. Most broiler facilities have phase diets, and an increasing number of broiler operations utilize feed additives such as phytase. All broiler operations were all assumed to have phytase additions to their diet, thus no benefit is observed. Phytase use is less common in turkey production where debates exist that the skeletal structure of poults is affected by phytase interactions with calcium. EPA assumed few if any layer facilities incorporated phased diets or feeding strategies beyond nutritional requirements of the birds and molting (if any), and assumed the frequency factor was zero.

Frequency Factors: Feeding Strategies

Region/Size	Sector			
	Swine	Broiler	Layers	Turkeys
MidWest/medium	14.9		0	5
MidWest/large	67.7			5
MidAtlantic/medium	17.8	100	0	5
MidAtlantic/large	72.7	100		5
South/medium		100	0	
South/large		100		

For swine, Midwest/medium <2,500 head, and MW/large ≥ 2,500 head; MA/medium <2,500 head, and MA/large ≥ 2,500 head.
For broilers, MA/medium = 300-1,000 AU and MA/large > 1,000 AU; SO/medium = 300-1,000 AU and SO/large > 1,000 AU.
For layers, no distinction is made between medium and large.
For turkeys, MW/medium = 300-1,000 AU and MW/large > 1,000 AU; MA/medium = 300-1,000 AU and MA/large > 1,000 AU.

5.8.1 Poultry

Phosphorus
The cost of adding phytase enzyme to feed ranges from $0.75 to $1 per ton of feed. For example, given that it costs $1 per ton of feed for phytase addition and that 11 pounds of feed are required to raise a broiler to market weight (5.5 pounds), the extra cost for phytase addition is $0.0055 per bird ($1/ton of feed divided by 2,000 lb/ton multiplied by 11 lb of feed per broiler). This is expected to achieve a reduction in phosphorus excretion of 20 to 60 percent depending on phosphorus form and concentration in the diet (NCSU, 1999). Protein content, calcium other mineral content, vitamin B, as well as other factors identified in the literature influence the effectiveness of phytase use in feed, but a 40 percent reduction was selected as a reasonable level of reduction when both phytase and precision feeding are utilized.

Nutrient content of the manure can also be reduced by precision feeding and phased feeding. One way to reduce nitrogen and phosphorus is to reduce the quantity of nutrients in the excreta of the animal. Dietary concepts designed to accomplish nitrogen and phosphorus reduction include enhancing the digestibility of fee ingredients; genetic enhancement of cereal grains and other ingredients that result in nutrients in feed ingredients being more digestible; more precise diet formulation; and improved quality control. While nitrogen and phosphorus are the focus of attention, these strategies also have the potential to decrease other nutrient excesses.

Nitrogen
The cost of reducing nitrogen in feed was estimated by assuming that a 20 percent reduction in nitrogen can be achieved with a 5 percent increase in feed cost. For example, reducing nitrogen in a $200/ton broiler feed would cost $10 per ton or $0.005 per pound of feed. If a broiler requires 11 pounds of feed to reach market weight, the additional cost would be $0.055 per bird. For a nitrogen management-based, 100,000-bird broiler operation with 5.5 production cycles per year, the implementation cost for feeding strategies is $30,250 per year (100,000 birds per production cycle x 5.5 cycles per year x $0.055 per bird). The implementation costs for turkeys are assumed to be the same as those for chickens.

5.8.2 Swine

Phosphorus
Adding phytase to a swine diet costs approximately $2.20/ton of feed. However, phytase replaces inorganic phosphorus as well as a small portion of protein. Similar to poultry in section 5.8.1.1, the increase in feed cost required to reduce phosphorus excretion by 40 percent is expected to be less than 1 percent. The nutrient content of the manure can also be reduced by precision feeding, split-sex feeding, and phased feeding. In practical terms, phosphorus excretion may be reduced by 0.6 kg per pig finished (a 40 percent reduction) with an investment of $0.36 in extra feed cost per pig finished. For example, a phosphorus management-based, 2,500-head farrow-to-finish operation with 2.1 production cycles per year would incur $1,890/yr to implement feeding strategies.

Nitrogen
The increase in feed costs attributed to reducing nitrogen excretion through precision nutrition or use of synthetic amino acids is expected to be less than 5 percent for a 20 percent reduction in nitrogen excretion. A larger decrease in nitrogen excretion is achievable, but only at a very high cost. In practical terms, nitrogen excretion may be reduced by 1.34 kg per pig finished (or 20 percent) with an investment of $2.70 in extra feed cost per pig finished (for a farrow-to-finish operation). The same 2,500-head farrow-to-finish operation would incur $14,175/yr for feeding strategy implementation. As the costs of synthetic amino acids comes down, the Amino Acid Council foresees an increased use of synthetic amino acids as a method of reducing nitrogen excretion as well as improving animal performance and decreasing feeding costs.

If the model farm is under an N-based regimen, costs with and without feeding strategies were compared. Nutrient reduction was calculated by subtracting 20 percent of the nitrogen produced after losses as calculated by USDA (1998). If the costs with feeding strategies led to an overall cost reduction, it was selected as one of the cost effective practices. However, because of the high cost of reducing nitrogen (a limiting nutrient in manure), it was often not the cost effective alternative. Feeding strategies under a P-based manure application system, on the other hand, were often cost effective.

Example of Excess Nutrient Calculations after Feeding Strategies Implementation

The cost model includes a calculation of the amount of land required for application of the nutrient of concern after feeding strategies implementation. In the 100,000-head broiler example, it was estimated that feeding strategies reduced phosphorus in manure by 40 percent, thereby reducing the land required for phosphorus application by 40 percent (from 1,054 acres to 633 acres). A new percentage can be calculated from the ratio between the area available for land application on-site (119 acres) and the land required for phosphorus application (633 acres), yielding a percentage of available land of 19 percent. This means that only 81 percent of the manure needs to be hauled off-site instead of 89 percent, which reduces the cost for manure transport.

5.9 Manure Hauling and Strategies to Make Manure More Transportable

The costs for transportation are dependent on the volume and mass of manure generated on farm. Reducing either the volume or the mass of the manure will decrease the cost of transportation. Little can be done with dry manure (e.g. broiler manure) because it is difficult and expensive to decrease its volume or mass. For liquid systems, the key factor in limiting transportation costs revolve around decreasing the water content of the wastes. This section provides details of how costs were developed for strategies that make manure more transportable.

5.9.1 Composting and Solid-Liquid Separation

Composting and solid-liquid separation are also used to manage waste. However only solid-liquid separation for swine was costed in this model. The frequency factors for solid-liquid separation by swine facilities were based upon industry data (USDA APHIS, 1995).

Frequency Factors: Solid-Liquid Separator - Swine Only

Region/Size	Swine
MidWest/medium	7.7
MidWest/large	0
MidAtlantic/medium	2.3
MidAtlantic/large	1.5
For swine, Midwest/medium <2,500 head, and MW/large ≥ 2,500 head; MA/medium <2,500 head, and MA/large ≥ 2,500 head.	

5.9.2 Dilution factors, Retrofit and Water Recycle

The dilution factor is a value multiplied by the as-excreted manure to provide the volume of manure as stored. The dilution factor has a value of one to three. A value of one means the stored manure has roughly the same volume as the excreted manure, such as with layer manure. Even though broiler and turkey manure is usually handled as litter, fresh manure is 75-80 %

moisture. The loss of moisture during storage is approximately replaced by the bedding material. A value of three means the manure is flushed and treated as a liquid. This was obtained by adding typical slatted floor flush volumes (MWPS) to typical precipitation plus the volume of a 25 year 24 hour storm event, with a 15% safety margin and freeboard. A value of slightly less than three reflects reductions in waste water volumes due to recycling of flush water and a reduction in fresh water consumption. Reductions in dilution factors are also obtained by reducing or eliminating precipitation from the liquid impoundments. The reduction of the dilution factor results in large reductions in volumes of liquid manures that must be hauled, with a corresponding reduction in hauling costs.

For example, a broiler house 40 ft x 400 ft with 25,000 birds has 4 inches of bedding to start, with an additional inch of bedding added after every flock:

(40 ft) x (400 ft) x (4 inches + 1 inch x 5.5 flocks) = 12, 670 cubic feet of litter

Fresh manure production from the single house is:

25,000 broilers x .14 lb manure/day x 49 days/flock x 5.5 flocks per year = 943,250 lbs manure

The density of broiler manure is 63 lbs per cubic foot, thus the house produces 14,972 cubic feet manure. Roughly 80 percent of the manure (or 12,000 cubic feet) is moisture, which is replaced the bedding.

5.9.2.1 Use of Dilution Factors in the Cost Model

Liquid manure is flushed from swine and poultry houses with varying amounts of water. To ensure that manure and water volumes not be underestimated a dilution factor of 3 was selected as baseline (see above). This value is multiplied by the manure production in an approach similar to USDA NRCS (1998). Thus, an operation that produces 1,000 gallons of manure "as excreted" actually produces 3,000 gallons of material after flushing. The resulting volume is thus the estimated annual pumpdown volume.

As a comparison, the University of Missouri estimates annual pumpdown volumes based on contributions from manure, daily fresh water inputs, net rainfall, and runoff. Though pumpdown will vary by rainfall and climate, the Missouri model predicts the dilution factor used by EPA may overestimate the volume of effluent associated with lagoon operations. EPA decided to maintain the value of 3 as a conservative dilution factor.

Lagoon Construction: Characteristics of a successfully operating animal waste lagoon vary throughout the U.S. Anaerobic lagoons for treatment of animal waste are designed on the basis of waste load added per unit volume of lagoon capacity. Total design volume equals the minimum design volume plus annual volume of livestock wastes produced plus the volume runoff plus the washdown water volume between pump out periods. Total design volume was calculated from the volume of manure as excreted times a dilution factor. The dilution factor for swine lagoons was set to three to account for flush water. An additional 15 percent was added as a safety factor for freeboard. For anaerobic lagoons, the design depth should be as deep as practical depending on site conditions. Where soil and groundwater conditions permit, depths of

20 feet may be used (ASAE, 1998). To account for unsuitable soil or groundwater conditions, a depth of 12 feet was selected for lagoon construction.

Lagoons were assumed to be square. Side slopes were set to a ratio of 2:1 based on MWPS (1993). The cost of constructing a lagoon was calculated by multiplying the total volume of soil to be excavated by the cost to excavate. NCSU determined that the all-inclusive cost for excavation was $2.60 per cubic yard.

5.9.2.2 Reduced Costs by Recycling Flush Water

Settling Basin Construction and Recirculating Pump: For operations with inadequate land to apply manure (Category 2 type operations), costs for a settling basin and a recirculating pump were estimated to reduce overall water use. Once the solids settle in the settling basin, the water is directed to the original lagoon where it is further cleaned. It is assumed that this cleaner water will suffice for recycling to flush the swine house. This resulted in a decrease in the dilution factor from 3 to 2 for Category 2 type operations. The excavation costs for the settling basin is the same as for lagoon construction (see previous section). The settling basin was sized to hold 20 days of the waste material. This amount of time allows for solids to settle (ICF, 1999) and some anaerobic digestion to occur. Additional costs include 250 feet of 6-inch pipe that cost $2.13 per foot (Tetra Tech, 1999 memo "Costs of Storage, Transportation, and Land Application of Manure") plus four hours of labor ($10 per hour) to install the pipe. A pump to recycle water from the original lagoon was assumed suitable to recycle the cleaner water for flushing. Cleanout and hauling of the sludge from the settling basin was assumed to be cost neutral even though the frequency would have to increase compared to cleanout and hauling of sludge from the original lagoon. Operation and maintenance of the settling basin was 2 percent of the total initial cost.

5.9.2.3 Retrofit to Scraper System

When facilities are retrofit to a scraper system, the dilution factor is 1. No additional water is added and scraped material is moved to a covered steel tank to limit dilution by rain. Scraper systems were applied to both swine and wet-layer facilities. One retrofit unit was required for each 1,250 hogs or 25,000 layers. Initial costs include the retrofit setup including motor, blade, steel tank, and closure of the old lagoon. Annual operation and maintenance include labor, electricity, replacement blades and the standard 2 percent of initial costs.

The initial retrofit setup costs are $36,000 for the installation and $200 for the motor for each retrofit device. Annual costs include motor usage (897 kWh @ $0.095 per kWh), replacement blades ($30), labor (52 hours @ $10 per hour), and 2 percent of initial costs ($724). A steel tank for storage of scraped materials was sized based on manure production by USDA NRCS (1998) at a cost of $0.18 per gallon.

Lagoon Cleanout: USDA NRCS developed an interim standard for closure of lagoons used in North Carolina. NCDENR (1999) prepared a list of all the lagoon closures that have been cost-

shared by the North Carolina Agriculture Cost Share Program. In a collection 65 dairy, beef, poultry, and primarily swine lagoons, the average cost to clean out the lagoon was $0.031 per gallon. This value was used to estimate the cost of lagoon cleanout nationally.

5.9.2.4 High Rise Houses

Menke et al. (2000) evaluated the construction costs for a two-story confinement housing design. Material falls through open slots onto the first floor where it is composted with carbon-rich material. A highrise house for 1,000 head of finishing pigs is 44 ft x 190 ft. On a per pig basis, a traditional deep pit house in Indiana/Ohio costs $155-160 per animal; a lagoon style flush house costs $145 per animal; the highrise building costs $185 per animal. The highrise building costs include professional engineering design that meets NRCS design standards. Building a deep pit house to these standard was estimated to increase a the construction cost of a deep pit house by $15,000 ($15 per animal).

Operation and maintenance costs for a highrise hog facility were estimated at 2 percent of initial costs. Additional costs include energy costs and drying agents. Energy costs for a traditional confinement building are estimated at $2,500 to $2,800 per year. The highrise building has average monthly costs of approximately $400 or $4,800 annually. Drying agents evaluated include wheat straw, corn stalks, and wood shavings. Around 50 to 60 tons of wood shavings are needed to start the house with two feet depth of material at an annual cost of $4,000 to $5,000 per year. In contrast, five feet of straw or corn stalk material are needed to absorb similar amounts of moisture. Even at a lower costs of $9 to $10 per 1,200 pound bale of corn stalks, the higher volumes to be handled offset the cost savings. Straw and corn materials also tend to degrade and compost more rapidly than wood requiring more frequent addition of drying material to the house.

5.9.2.5 Digesters and Recycle Flush Treatment for Option 5

Digesters or recycle flush treatments both reduce the amount of water added to manure. For digesters, a covered lagoon eliminates rain from entering the lagoon. Lagoon cover costs are described below. Recycle or recirculating flush treatments limit additional water additions from rain. Both digesters and recycle flush practices allow cleaner, treated water to be re-used for flushing manure.

Lagoon Covers: According to the American Society of Agricultural Engineers standards (ASAE, 1998), a minimum lagoon depth of 5 feet is necessary for construction of anaerobic lagoons. Approximately 20 feet is considered the maximum depth to ensure proper biological activity. For this analysis 12 feet was selected as the maximum depth of all lagoons. The side slopes for lagoons were assumed to be 2:1 (horizontal to vertical) (MWPS, 1993, and ASAE, 1998), and the lagoon shape was assumed to be square. The surface square footage was then calculated to determine the costs of a lagoon cover.

Several lagoon cover manufacturers were contacted to identify costs of purchasing and installing lagoon liners. The results of the survey are shown in Table 5-10. Installed lagoon covers range from $1.20 to $4.81 per square foot, with lower costs per square foot expected at larger installations and depending whether insulation is required. Thus, to develop costs for installation of insulated lagoon covers, a cost of $4.00 per square foot was assumed.

Operation and maintenance costs for lagoon liners were estimated at 2 percent of initial costs.

5.9.3 Transportation of Excess Manure

Category 2 type facilities do not have enough land to apply all their manure and must transport some off-farm. Category 1 type operations have enough land to apply manure and Category 3 type operations already pay to transport their manure. The number of Category 1, 2, and 3 type operations was identified in an analysis conducted by USDA's Kellog et al. (2000). In their analysis, Kellog et al. used the 1997 Census of Agriculture on a county by county basis to determine how many operations have enough land, do not have enough land, or have no land to apply manure on land. Facilities with "no land" did not raise any of the 24 major crops identified in the 1997 Census. Results were presented nationally and were applied to the various model farms. Dilution factors for Category 2 type wet manure operations were reduced to 2 due to addition of a settling basin and a recirculating pump (see section 5.9.2.2).

5.9.3.1 Quantity of Manure to Be Hauled

To calculate the costs of hauling solid manure off-site, the mass of manure (including bedding) was calculated using the tons of waste produced per animal per year (Table 5-11) and the number of animals in the facility. For example, a 100,000-head broiler operation produces 1,597 tons of manure per year (100,000 birds x 31.93 lb/animal/yr ÷ 2,000 lb/ton).

Table 5-11. Animal and Manure Mass and Manure Quantity Values Used to Calculate the Total Amount of Manure and Litter Produced by Each Operation

Manure Consistency	Type of Animal	Animal Mass (lb)	Quantity of Manure
Liquid (gal/animal/yr)	Grower-Finisher	110.0	300.36
	Farrow-to-Finish	123.0	335.86
	Breeder	374.5	1,022.60
	Layer	3.7	9.40
Solid (lb/animal/yr)	Broiler	2.5	31.93 (includes litter)
	Integrated Layer	3.7	31.60 (includes litter)
	Turkey Hen	8.8	78.05 (includes litter)
	Turkey for Slaughter	13.8	122.40 (includes litter)
	Integrated Turkey	11.3	100.23 (includes litter)

To determine the quantity of manure to be hauled off-site, a percentage can be calculated from the ratio of available acres for land application versus the amount of land needed to apply all of the nutrient of concern. For example, in the 100,000-head broiler operation mentioned above with phosphorus-based nutrient management, 119 acres are available for land application on-site,

but 1,054 acres are needed to apply all of the phosphorus in the manure. Therefore, only 11 percent of the land required for manure application is available on-site, and 89 percent of the manure needs to be transported off-site. To determine the mass of manure to be hauled, the total mass of manure produced per year was multiplied by this percentage. For the 100,000-head broiler operation, 1,416 tons of manure required transport (1,596 tons of manure produced x 89 percent).

For liquid manure, the quantity of manure to be disposed of (in gallons) was calculated from the amount of manure excreted (see Table 5-11) multiplied by a weighted recoverable manure correction factor (shown in Table 5-12) and a dilution factor of 2 or 3 (see discussion above). The ratio of land available for application vs. land needed for application can be used to derive the number of gallons of manure that need to be hauled.

Table 5-12. Recoverable Manure Correction Factors for Different Operation Types in Different Regions

Operation Type	Region	Recoverable Manure Correction Factor
Swine	Central	0.95
	Mid-Atlantic	0.97
	Midwest	0.94
	Pacific	0.90
	Southern	0.96
Chicken	Central	0.99
	Mid-Atlantic	0.94
	Midwest	0.98
	Pacific	0.88
	Southern	0.90
Turkey	Central	0.75
	Mid-Atlantic	0.97
	Midwest	0.62
	Pacific	0.94
	Southern	0.72

5.9.3.2 Manure Hauling Distances

Due to lack of information on specific county manure excesses and deficits from the 1997 Census of Agriculture data, the following approach was used by EPA to develop transportation distances for one-way hauling of excess manure from category 2 and 3 operations (Appendix E).

Category 2 operations (see Section 4.2.4 for a discussion of categories), determined by manure generation and nutrient application (based on 1997 Census of Agriculture Queries), have different transportation distances depending on whether manure is applied on a nitrogen-based or phosphorus-based application scenario. In the event that an operation has insufficient land to apply manure on a nitrogen basis, Equation 1 was used to estimate transportation distance:

$$N_{distance} = ICD \quad \textbf{(1)}$$

where $N_{distance}$ is the transportation distance (miles) for category 2 operations with manure applied at agronomic N rates and ICD is the in-county transportation distance (miles) from Table 5-13. The procedure used to calculate values in Table 5-13 is described in Appendix F and G, but the values in Table 5-13 resulted from the combination of regions (e.g., Southern and Delta) for which distances are given in Appendix F.

Transportation distance for category 2 operations with manure applied on an agronomic phosphorus basis is determined by Equation 2:

$$P_{distance} = ICD + \frac{(OCD - ICD)}{3} \quad \textbf{(2)}$$

where $P_{distance}$ is the transportation distance (miles) for category 2 operations with manure applied at agronomic P rates (miles), OCD is the out-of-county transportation distance (miles) from Table 5-13, and ⅓ is a factor that takes into account that some operations may have to transport out of county while others may not.

Category 3 operations have no land, and it is assumed that all are already incurring costs for transportation on an agronomic nitrogen basis. Offsite recipients are most commonly crop farmers that will accept and apply manure based on the nitrogen requirements of the crops. The incremental transportation distance for switching to an agronomic phosphorus basis is depicted in Equation 3:

$$P3_{distance} = \frac{(OCD - ICD)}{3} \quad \textbf{(3)}$$

where $P3_{distance}$ is the transportation distance (miles). This distance is used to determine incremental hauling costs for Category 3 operations under technology options 2 through 8 (i.e. where manure application rates may be limited to phosphorus based applications).

Table 5-13 In-County Transport Distances and Out-of-County Transport Distances for the Various Regions in the United States

Region	In-County Transport (mi)	Out-of-County Transport (mi)
Northeast, Appalachian	5.5	81
Southern, Delta	6.0	32
Northern Plains, Lake States, Corn Belt	6.5	17
Pacific	12.5	39
Mountain, Southern Plains	11.0	27

These equations have been used to calculate regional transportation distances. The results of the equations are shown in Table 5-14.

Table 5-14. Transportation Distances for Category 2 and 3 Operations for the Various Regions in the United States

Region	Category 2		Category 3	
	N Basis	P Basis	N Basis	P Basis
Northeast, Appalachian	5.5	30.5	0.0	25.0
Southern, Delta	6.0	14.5	0.0	8.5
Northern Plains, Lake States, Corn Belt	6.5	10.0	0.0	3.5
Pacific	12.5	21.5	0.0	9.0
Mountain, Southern Plains	11.0	16.5	0.0	5.5
Note: All values rounded to the nearest ½ mile.				

5.8.3.3 Manure Hauling Costs

For solid manure, hauling costs were based on the amount of manure to be hauled multiplied by a dollar per ton rate that varied depending on the transport distance (which is an operation-specific input parameter). For liquid manure, a baseline per gallon rate was assigned, with an additional per mile charge for transport. Table 5-15 shows the rates that were used to estimate the costs of hauling and applying solid and liquid manure over different distances.

Table 5-15. Costs for Hauling Manure Off-Site for Solid and Liquid Manure

Manure Consistency	Distance	Cost ($/ton)
Solid	1-90 miles	$0.10 per ton
	90-180 miles	$0.23 per ton
	More than 180 miles	$0.18 per ton
Liquid	Less than 1 mile	$0.10 per gallon
	Additional cost per mile	$0.001 per mile

6.0 ENERGY COSTS

Technologies with high energy input tend toward high investment costs and high operating costs. With the exception of some runoff control situations, every nonpolluting waste management technology uses energy from electric power or consumption of a common fuel. For technologies such as land utilization of manure, the energy is used mainly for transferring or transporting the waste material. For others, energy provides the mixing or aeration needed for efficient biological treatment of the waste. For still other technologies, such as dehydration and pyrolysis, energy input forces rapid physical or chemical changes in the waste material.

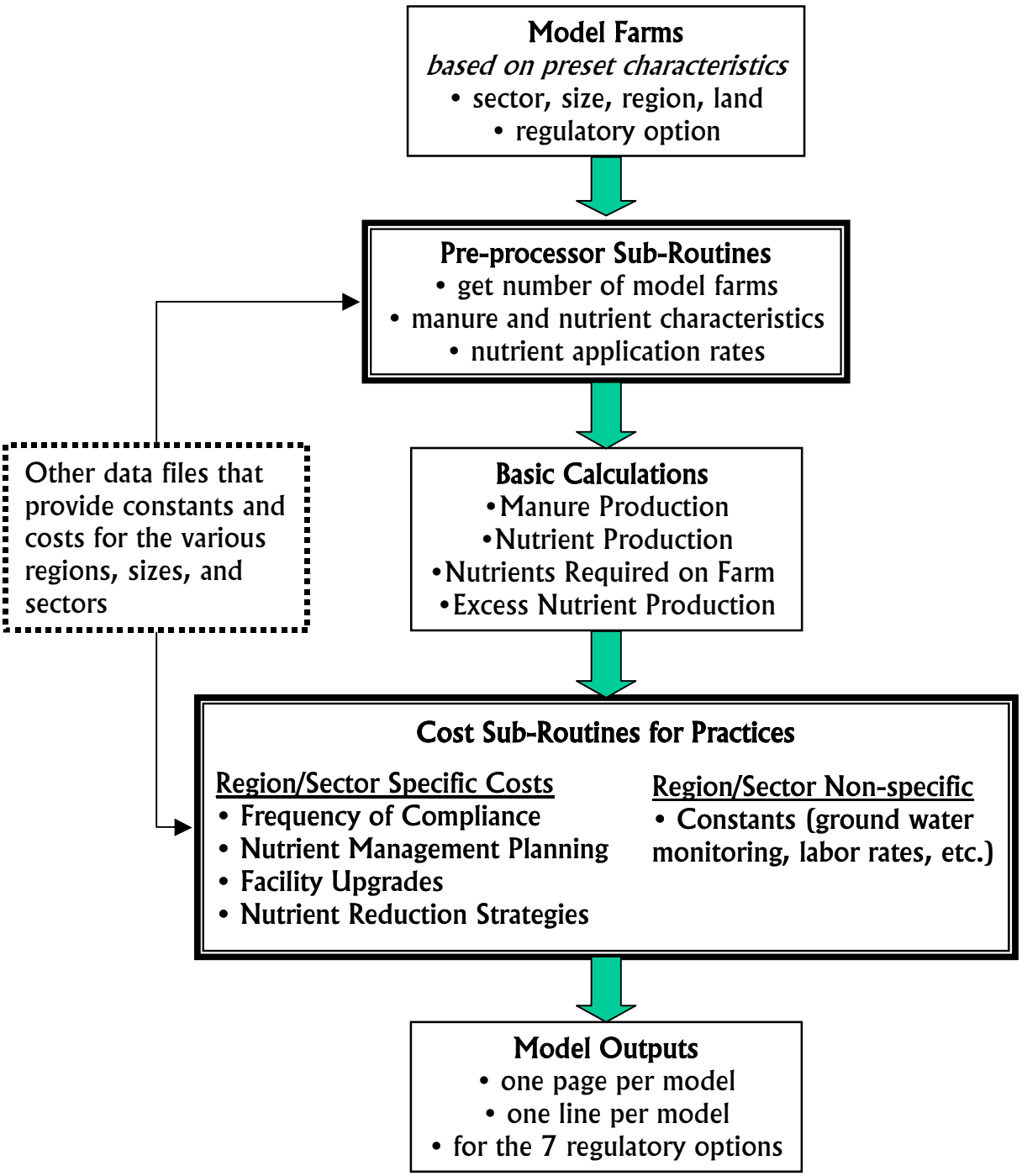
Energy costs are addressed indirectly in the cost model by adding 2 percent to all capital costs for operation and maintenance. Operation and maintenance includes, but is not limited to, energy costs.

7.0 COST MODEL STRUCTURE

The core of the cost model is the “Main” program that draws upon several subroutines and data files to calculate costs associated with nearly one-thousand model feedlots. The Main program and its subroutines input data files with model feedlot information, constants associated with manure characteristics and cropping systems, frequency factors, numbers of farms represented by each model, technology costs, and various other variables essential to the cost modeling effort. Outputs include fixed, fixed amortized, and annual non-amortized costs for facility upgrades, land application, and nutrient management.

The basic organization of the cost model for swine and poultry operations is depicted in Figure 6-1.

Fortran Cost Model Flow Diagram



7.1 Program Code

The cost model for swine and poultry is written using DIGITAL FORTRAN 90, Version 6. The Main program, subroutines, and data files are described below.

7.1.1 "Main" Program

Purpose: The Main program (file name = Main category option (000117).f90) calculates practice-specific and total costs for each model facility.

Data Called: This program draws on data files with model facility information, frequency factors, constants associated with manure characteristics and cropping systems, labor rates, numbers of farms represented by each model, technology costs, the effectiveness of technologies and management strategies, and other cost and technical data. Subroutines are used by the program to read data files and perform some calculations, as illustrated in Figure 6-1.

Sample Code: Code using compliance subroutine to read in frequency factors:

```
call compliance(animal,nohead,opertype,region,pswmon,ptrain,passess,pgwinst,&
        pauger,pmansamp,pcalib,pbuff,pcnmp,pmantest,psoiltest,&
        preckeep,pcaleqp,pgwmon,peros,pmortfac,pstor,pdep,pswdiv,pliner,&
        pinsp,pmort,pswmom,plinerom,pdisk,pincorp,pinject,pinjom,pcp,pcpom,&
        pfs,pfsep,psell,pgive,compliancefac)
```

Code to calculate volume of manure, and phosphorus and nitrogen in the manure:

```
manvol=nohead*animwt*mcvolume/1000*365*7.481 !value in gallons
manwt=nohead*animwt/1000*mcweight*2000*RMCF !2000 is conv. tons to lbs.
dilmanwt=mcwtdil*nohead*animwt/1000*365        !not converted into tons
mann=nohead*animwt/1000*mcweight*mcn*RMCF
manp=nohead*animwt/1000*mcweight*mcp*RMCF
```

Key Calculations: The basic equations used in the cost model are provided in Appendix G, and variable names are defined in Appendix H.

Outputs: Outputs include fixed, fixed amortized, and annual non-amortized costs for facility upgrades, land application, and nutrient management for each of the nearly one-thousand model facilities for swine and poultry. See Section 6.3 for a sample output.

7.1.2 Subroutines

7.1.2.1 constants.f90

Purpose: Subroutine will input into memory constants to be used in various calculations throughout the cost model program.

Data Called: Reads from the file, NutManDat.dat, the data shown in Table 7-1.

Table 7-1. Data Read by Subroutine Constants.f90

Data [variable name] (units)	Value
Installing Groundwater Monitoring Well [gwinst] ($ initial cost)	2885
Time to Sample Groundwater Monitoring Well [gwtime] (hours per year)	1
Cost of water sample analysis [wateranal] ($)	75
Assessment of crop field/groundwater link to surface water [assess] ($ per sample)	3082
Record Keeping and Reporting [reckeep] ($ per year)	880
Training and certification to land apply manure [train] ($ per 3 years)	117
Purchase a manure sampler [mansamp] ($, initial cost)	30
Manure nutrient analysis [mananal] ($ per sample)	40
Setup and time required to take first manure sample [manfirstsamp] (hours per sample)	1
Time required for additional samples [manaddsamp] (hours per sample)	0.25
Soil sampling frequency--low end [soilsampfreqlow] (acres/sample)	10
Soil sampling frequency--site specific approach [soilsampfreqhi] (acres/sample)	2.5
Purchase a soil auger [soilauger] ($, initial cost)	25
Time required to take sample--low end [soilsamptimelow] (hours per sample)	1
Time required to take sample--site specific approach [soilsampfreqhi] (hours per sample)	0.1
Cost of soil analysis ($ per sample)	10.0
Rate for obtaining a certified NMP [nmprate] ($/acre)	5
Purchase scale to calibrate manure spreader [calibinit] ($, initial cost)	250
Time required to calibrate manure spreader [calibann] (hours/year)	4
Tarp to calibrate manure spreader [tarp] ($/year)	15
Tractor cost ($/hour)	30
General labor rate [labor] ($/hour)	10
Professional labor rate [plabor] ($/hour)	55
Amortization rate [amort] (percent)	0.08
Property tax [ptax] (percent)	0.01
Standard maintenance [maint]	0.02

7.1.2.2 facupg.f90
Purpose: Reads into memory various constants used for facility upgrades.

Data Called: Reads from the file, FacUpg.dat, the data shown in Table 7-2.

Table 7-2. Data Read by Subroutine Facupg.f90

Data [variable name] (units)	Value
Shaving material application depth [shavdep] (inches per year)	3.0
Rate of litter storage cleaning [litfreq] (per year)	1.0
Length of Litter Storage (months)	6.0
Time allowance for litter transfer to storage [stortrans] (hours)	30.0
Time allowance for litter storage cleaning [litclean] (hours)	30.0
Area of house [housarea] (square feet)	16000
Bulk price for wood shavings [shavcost] ($/cf)	0.10
Squarefoot cost of 4'high litter storage facility [storfaccost] ($ per square foot)	7.50
Lagoon Depth Marker [lagdepmark] ($, initial cost)	30.00
Diverstion berm top width [divtop] (feet)	1.0
Diversion berm height [divhei] (feet)	3.0
Diversion berm side slope [divslp]	2.0
Cost to move earth [earthmov] ($/cu.yd)	2.60
Time required for weekly visual inspection [visinsptime] (hours)	0.25
Cost of liner material [linercost] ($ per sq.ft)	1.60
Cost of insulated lagoon cover [covercost] ($ per sq. ft)	4.00

7.1.2.3 getnumber.f90
Purpose: To read the number of model facilities to determine the number of iterations to run in the Main program.

Data Called: Reads the number of records from the file, ModelFac.csv.

Outputs: The number of iterations that the cost model must run.

7.1.2.4 readmodel cost.f90
Purpose: To read in model feedlot information

Data Called: Reads from the file ModelFac.CSV, the following data for each model facility:

Animal type [animal]
Operation type [opertype]
Region [region]
Nutrient management basis (N or P) [nmbase]
Land application category [icat]
Transport distance [transport]
Number of facilities [nofac]
Average farm size [farmszorig]
Number of head [nohead]
Manure type [mantype]
Operation size ID [sizeid]

7.1.2.5 Readregion Cost.f90
Purpose: Reads Regional data for use in Main program.

Data Called: Reads from the file, Region.dat, the following data:

Animal type [animal]
Operation type [OperType]
Region [Region]
Recoverable manure correction factor [RMCF]
Nitrogen uptake [nuptake]
Phosphorus uptake [puptake]

7.1.2.6 nutdatacost.f90
Purpose: To read in the manure characteristic data and cropping system data.

Data Called: Reads from the file, ManChar.dat, the following data:

Type of operation [Opertype]
Animal turnover rate [turns]
Average weight of animal [animwt]
Manure characteristics, weight of manure produced (lbs/day/1000lbs) [mcweight]
Manure characteristics, [mcwtdil]
Manure characteristics, volume of manure produced (cubic feet/day/1000#) [mcvolume]
Manure characteristics, moisture content of fresh manure [mcmoist]
Manure characteristics, nitrogen in manure (lbs/day/1000#) [mcn]
Manure characteristics, efficiency of nitrogen application to field [mcneff]
Manure characteristics, phosphorus in manure (lbs/day/1000#) [mcp]
Manure characteristics, efficiency of phosphorus application to field [mcpeff]
Manure characteristics, potassium in manure (lbs/day/1000#) [mck]
Manure characteristics, efficiency of potassium application to field [mckeff]
Dilution factor [dilfac]
Percent of birds that die in one turnover of animals [pctdead]

Average weight of animals at death [deadwt]
Length of animal life [deadlen]

7.1.2.7 compliance.f90
Purpose: To read data on frequencies at which practices are currently implemented on model facilities..

Data Called: Reads from the file, Compliance.csv, the following:

Animal type [animal]
Number of head [nohead]
Operation type [opertype]
Region [region]
Surface water monitoring, including operation & maintenance [pswmon]
Training and certification of manure applicators [ptrain]
Assessment of ground water linkage to surface water [passess]
Ground water monitoring well installation [pgwinst]
Soil sampling auger [pauger]
Manure sampler [pmansamp]
Scales (two) for manure spreader calibration [pcalib]
Stream buffer and O&M [peros]
Initial development of comprehensive nutrient management plan [pcnmp]
Manure testing [pmantest] or [pmtest]
Soil testing [psoiltest] or [pstest]
Record keeping [preckeep] or [preckp]
Calibration of manure spreader [pcaleqp] or [pcal2]
Ground water sampling [pgwmon]
Mortality composting/rendering facility [pmortfac]
Adequate storage [pstor]
Lagoon depth marker [pdep]
Storm water diversion & operation and maintenance [pswdiv]
Lagoon liner [pliner]
Visual inspection [pinsp]
Mortality compost facility operation and maintenance [pmort]
Lagoon liner operation & maintenance [plinerom] and [plinOM]
Feeding strategies [pfs]
Solid-liquid separator [pfsep]

7.1.2.8 nutred.f90
Purpose: To read in constant data regarding feeding strategies, solid/liquid separator costs, etc., to reduce excess nutrients.

Data Called: Reads from the file, NutRed.dat, the data shown in Table 7-3.

Table 7-3. Data Read by Subroutine Nutred.f90

Data [variable name] (units)	Value
N reduction in manure from feeding strategies	0.20
P reduction in manure from feeding strategies	0.40
Feeding strategy for P costs per pig	0.36
Feeding strategy for P costs per chicken	0.0055
Feeding strategy for N costs per pig	2.70
Feeding strategy for N costs per chicken	0.055
Costs of hauling and applying liquid manure <1 mi($/gal)	0.10
Additional costs for liquid ($/mile)	0.001
Costs of hauling and applying solid manure 1-90mi ($/ton)	0.10
Costs of hauling and applying solid manure 90-180mi ($/ton)	0.23
Costs of hauling and applying solid manure >180mi ($/ton)	0.18
Cost of separation device	5000.00
Separation safety factor (additional storage)	0.15
Separator efficiency	0.30
Solids content of separated manure	0.23
Pipe length to connect lagoon to separator (feet)	250.00
Cost of pipe ($/foot)	2.13
Cost of installing a steel storage tank ($/gallon)	0.18
Time required to install pipe and set up separator (hours)	4.00
Amount of P transferred after separation (X1000)	58.00
Amount of N transferred after separation (X1000)	58.19
Retrofit initial investment per 1,250 swine	36000.00
Retrofit 1/4 HP Motor per 1,250 swine	200.00
Retrofit motor usage per day kWh	897.00
Electricity Cost per kWh ($)	0.095
Retrofit labor required per year (hours)	52.00
Retrofit blades required per year	30.00
HighRise Construction ($/pig space) [confconst]	185.00

HighRise Fuel, Repairs, and Utilities ($/pig space) [confmisc]	3.22
Hoop Structure Construction ($/pig space) [hoopconst]	55.00
Hoop Feed and Manure Equip ($/pig space) [hoopfm]	36.00
Hoop Bedding ($/pig space) [hoopbed]	4.20
Hoop Fuel, Repairs, and Utilities ($/pig space) [hoopmisc]	1.40
Hoop labor (hours/pig space) [hooplab]	1.12

7.1.2.9 sort.f90
Purpose: To select the least-cost alternative for each option.

Outputs: Least-cost alternative for each option for each model farm.

7.1.3 Data Files

Two types of data file structures are used: fixed-format files (*.dat) and variable-format files (*.csv) where data elements are separated by commas.

7.1.3.1 ModelFac.csv
This file contains the following data elements regarding the model feedlots:

Animal type (e.g., swine, chickens)[AnimalType]
Operation type (e.g., farrow-to-feeder, broiler) [OperType]
Region (e.g., Mid-Atlantic, Midwest) [Region]
Nutrient management basis (P-based or N-based) [NMBase]
Land application category (1, 2, or 3) [Category]
Option [option]
Number of facilities in this category [facility]
Farm size: average acres of cropland available for nutrient management planning [farmsz]
Number of head [head]
Manure management system (liquid or solid)[mantype]
Facility size (large1, large2, medium1, medium2) [sizeid]

Sample Records
Swin,GF,MA,N,1,1,291,0,1242,liq,medium1,1,,#REF!,,
Swin,GF,MA,N,1,1,122,0,2184,liq,medium2,1,,#REF!,,
Swin,GF,MA,P,3,2,36,1,1242,liq,medium1,0.6
Swin,GF,MA,P,3,2,17,1,2184,liq,medium2,0.6

7.1.3.2 Region.csv
This file contains region-specific constants regarding manure and crop uptake of nutrients.

Animal type [animal]
Operation type [Opertype]
Region [Region]
Recoverable manure correction factor [RMCF]
Nitrogen uptake [Nuptake]
Phosphorus uptake [Puptake]

Sample Records
BR,CE,0.95,215,15
BR,MA,0.97,183,20

7.1.3.3 Compliance.csv
This file contains data elements regarding the extent to which practices are currently implemented on model facilities. See Section 6.1.2.7 for a list of data elements contained in this file. Section 5.1 contains the frequency factor values found in this file.

Sample Records
BR,CE,100000,0,0,0,87.4,0,0,0,0,0,0,0,0,0,87.4,0,87.4,30,0,0,87.4,0,87.4,0,87.4,0,0,0,0,0,0,0,0,,
BR,MA,100000,0,12.1,0,76.09,0,12.1,12.1,0,12.1,12.1,12.1,12.1,12.1,76.09,0,76.09,30,12.1,0,76.09,0,76.09,0,76.09,0,0,0,0,0,0,85,0,,

7.1.3.4 ManChar.dat
This file contains data regarding manure characteristics and cropping systems. See Section 7.1.2.6 for a list of data elements contained in this file.

Sample Records:
GF 2.8 110.0 14.69 14.69 1.00 0.90 2.82 1.00 2.80 1.00 7.16 1.00 3.00 0.05 110.0 123.0
FF 2.1 110.0 14.69 14.69 1.00 0.90 2.82 1.00 2.80 1.00 7.16 1.00 3.00 0.05 110.0 123.0
FX 1.72 110.0 14.69 14.69 1.00 0.90 2.82 1.00 2.80 1.00 7.16 1.00 3.00 0.05 110.0 123.0

7.1.3.5 NutManDat.dat
This file contains constant data regarding nutrient management. See Section 6.1.2.1 for a listing of all data elements and values contained in this file.

7.1.3.6 FacUpg.dat
This file contains constant data regarding facility upgrades. See Section 6.1.2.2 for a listing of all data elements and values contained in this file.

7.1.3.7 NutRed.dat

This file contains constant data regarding feeding strategies, solid/liquid separator costs, etc., to reduce excess nutrients. See Section 6.1.2.8 for a listing of all data elements and values contained in this file.

7.2 Applications

Separate costs were developed for 960 model facilities for swine and poultry, as shown in Table 7-4. The total cost of each option for a specific animal type is then determined by multiplying the costs of each model facility for that animal type by the number of facilities the model represents, and then summing the costs.

Table 7-4. Number of Model Facilities by Animal Type

Animal Type	Required for ELG[a] Options	Categories	Regions	Size Classes	Total
Broilers	8	3	2	4	192
Layers - Wet	8	3	1	2	48
Layers - Dry	8	3	2	4	192
Turkeys	8	3	2	3	144
Swine - GF	8	3	2	4	192
Swine - FF	8	3	2	4	192
Total					960

[a] See Section 4.3 for a discussion of options

7.3 Outputs

Both formatted and unformatted outputs are created by the cost model. The following is a sample formatted output for one model facility.

MODEL FACILITY Wed Mar 22 05:48:38 2000

Chicken Broilers, litter on floor Mid-Atlantic Region

Size of Operation	44193 head
Nutrient Management Basis	Nitrogen
Cattegory/Option	1/ 1
Number of miles excess manure must be transported	0 miles
Number of facilities in this category	158 facilities
Acres of cropland only available on farm	0 acres

CALCULATIONS

Mass of fresh manure	1604.305 tons
Mass of waste litter	705 tons
Nitrogen produced	25829 lbs.
Phosphorus produced	4241 lbs.
Number of acres needed to apply Nitrogen	141 acres
Amount of N required on farm	26087 lbs.
Amount of P required on farm	2851 lbs.
Tillable acres (less buffer)	142 acres
Manure Given Away (%)	0

NUTRIENT MANAGEMENT PLAN		FIXED	FIXED AMORT	ANNUAL NON-AMORT	3 Years	FREQUENCY	TOTAL
1)Fixed one-time costs							
Training and certification for manure appl.		$	117.			16.60	98.
Assessment of crop field/GW link to SW	GW	$	0.			0.00	0.
Ground water monitoring well installation	GW	$	0.			76.09	0.
Surface water monitoring		$ 0.				0.00	0.
Cost of soil auger		$ 25.				0.00	25.
Cost of manure sampler		$ 30.				16.60	25.
Cost of 2 scales for manure spreader calibration		$500.				16.60	417.
Cost to develop initial NMP		$	739.			16.60	616.
2)Nonannual reoccuring costs							
On-farm NMP development (every 3 years)		$			739.	16.60	616.
On-farm soil testing (every 3 years)		$			19.	16.60	16.
3)Annual Costs							
Record keeping		$		880.		16.60	734.
Calibrate manure spreader		$		40.		16.60	33.
Manure testing (twice per year)		$		185.		16.60	154.
O&M for ground water monitoring	GW	$		0.		76.09	0.
O&M for surface water monitoring			$	0.		0.00	0.
Total (after including frequency)		$467.	714.	922.	632.		2734.

FACILITY UPGRADES

1)Fixed one-time costs							
Mortality composting facility	GW	$ 0.				76.09	0.
Storage (for poultry litter)		$32186.				30.00	22530.
Lagoon depth marker		$ 0.				16.60	0.
Divert storm water around structures		$ 1443.				0.00	1443.
Field runoff control -- Establish buffer		$ 531.				5.00	504.
2)Annual Reoccurring Costs							

Visual inspection	$		130.		0.00	130.
Mortality composting operation and maint. GW	$		0.		76.09	0.
Storm water diversion operation and maint.	$		29.		0.00	29.
Field runoff control (O&M & land rental value)	$		329.		0.00	329.
Total (after including frequency)	$24477.	0.	488.	0.		24965.
LAND APPLICATION						
1)Solid Manure Application						
a) Solid manure application already practiced						
b)Incorporation						
Initial cost of disk harrow	$0.				0.00	0.
Annual O&M for incorporation	$		0.		0.00	0.
Total	$0.	0.	0.	0.		0.
Total (NMP, facility, land app)	$24944.	714.	1410.	632.		5002.
CONTINGENCY (1% CAPITAL COSTS)	245.					
REDUCING EXCESS NUTRIENTS						
No nutrient reduction scenarios required. Category 1 farm.						

8.0 REFERENCES

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Appendices

Appendix A

Differentiating Breeding, Slaughter, and Integrated Operations

To: Jan Goodwin
From: Jon Harcum
Subject: Differentiating breeding, slaughter, and integrated operations
Date: December 14, 1998

This memo documents the approach used to distinguish between categories of animal sectors. Several animal sectors (swine, chickens, turkeys, beef) have tended to specialize into operations that primarily (a) grow out animals for slaughter (or egg production), (b) provide breeding or replacement stock, or (c) a combination of breeding and grow out. In reality, animal operations do not easily fit into one of these three categories, but are more likely to stretch across a spectrum. Nevertheless, EPA has determined to model these specializations and it is now necessary to characterize the number of operations in each specialization using data from the Census of Agriculture. Below are the specializations that EPA has selected. Note, that broilers will be modeled but no specialization was selected, and that decisions about modeling beef and dairy have not been made at this time.

Swine
- Slaughter (finishing)
- Breeding (farrowing)
- Integrated (farrow-to-finish)

Chickens (excluding broilers)
- Layers (egg production)
- Pullets (replacement)
- Integrated (layers and pullets)

Turkeys
- Slaughter
- Breeding
- Integrated

Beef
- Cow-calf
- Slaughter

Using professional judgement it was determined for a given animal sector that if 95 percent of the animals (in animal units) on an operation were breeding stock and less than 25 animal units were for slaughter, then that operation is classified as an operation growing animals for breeding. Similarly if for a given animal sector that if 95 percent of the animals (in animal units) on an operation were grown out for slaughter and less than 25 animal units were breeding stock, then that operation is classified as an operation for growing animals for slaughter. The remaining operations would be classified as integrated.

Ultimately, the values of 95 percent and 25 animal units were heuristically chosen; however, the following issues were considered:

- If 95 percent of the operation is dedicated to a specialty (e.g., breeding or grow out) then most of the manure can be attributed to the specialty. It is also likely that this specialty accounts for a large portion of the revenues associated for that animal sector.

- It is not uncommon for animal operations to have a few animals for show (at county or state fairs), for personal slaughter, for 4-H or FFA projects, or out of tradition. (Granted 25 animal units of layers is quite a lot of animals for showing at a county fair.)

- In a farrow-to-finish operation about 15 percent of the head are breeding stock.

Appendix B

Crop Nutrient Requirements

To: Paul Shriner
From: Jed Waddell, George Townsend & Steve Dressing
Subject: Updated Crop Nutrient Requirements
Date: February 16, 2000
Contract: EPA Contract 68-C-99-263, Work Assignment B-04

Updated crop nitrogen and phosphorus requirements were refined to more adequately depict conditions of the Model Farm. Extension personnel from counties with the densest populations of animals were consulted to determine the common cropping practices for the all regions and sectors. Although the Cost Model is only run on two principle regions for each sector, all regions are presented in this analysis for their use in the Nutrient Loading Analysis.

County Extension personnel identified the typical crop rotation for each sector (Table 1). Crop yields were determined by dividing the harvested quantity by the acreage obtained in the 1997 Census of Agriculture (USDA:NASS, 1999). Occasionally, yields were far below expected yields and were changed to reflect expected yields found in the Ag Waste Management Field Handbook (AWMFH, USDA, 1992). Crop nutrient removal was based on Appendix I, Table A-1, Nutrient Content Values, for the major crops (Lander et al., 1998). The nitrogen application rates was increased to reflect the 30 percent loss of nitrogen after land application of manure (Sutton et al., 1985) due to volatilization of ammonia.

Table 1. Crop Yields, Nutrient Removal and Application Rates from the Ag Waste Management Field Handbook (AWMFH) for Typical Crops used on Swine and Poultry Operations in the various Regions.

Sector	Region	Crop	Yield†	Census Yield	Yield Unit	Nitrogen Removal	Phosphorus Removal	Nitrogen Application	Phosphorus Application
Swine	CE	Corn	162	162	Bushels/acre	129	24	185	24
	MA	Corn	83	83	Bushels/acre	67	12	95	12
		Soybean	28	28	Bushels/acre	100	10	143	10
		Rye	25	25	Bushels/acre	26	4	38	4
	MW	Corn	135	135	Bushels/acre	108	20	154	20
		Soybean	48	48	Bushels/acre	170	17	242	17
	PA	Corn chop	23	23	Tons/acre	160	24	228	24
		Oats	90	90	Bushels/acre	53	10	76	10
		Alfalfa	7	7	Tons/acre	356	33	509	33
	SO	Bermuda	8	3	Tons/acre	150	15	215	15
Poultry	CE	Bermuda	8	4	Tons/acre	150	15	215	15
	MA	Corn	123	123	Bushels/acre	98	18	140	18
		Soybean	27	27	Bushels/acre	94	10	135	10
		Wheat	63	63	Bushels/acre	64	13	91	13
	MW	Fescue	5	3	Tons/acre	99	10	141	10
	PA	Corn chop	23	23	Tons/acre	165	24	236	24
		Oats	102	102	Bushels/acre	60	11	86	11
		Alfalfa	7	7	Tons/acre	352	33	503	33
	SO	Fescue	5	4	Tons/acre	99	10	141	10

† Yields were taken from the 1997 Census of Agriculture. The census combined information for the specific grass varieties (e.g. fescue and bermudagrass) occasionally resulting in lower yields when compared to AWMFH. Where sizeable discrepancies were identified (Swine, SO; Poultry, CE, MW, SO) AWMFH yields were used instead of census yields.

The average annual nitrogen and phosphorus crop removal and application rates were calculated by dividing the total crop requirements over the time to complete a full crop rotation (Table 2). Also given in Table 2 are other estimates of regional nitrogen requirements by Clipper and Shriner for comparison. Clipper's estimates were derived after conversation with county extension agents. Shriner's estimates were based on averaging all 24 crops and pastureland presented in the 1997 Census of Agriculture (USDA:NASS, 1999). There is no clear pattern in the estimates (one estimation method is neither consistently higher or lower than the others).

Table 2. Comparison of Nutrient Removal and Application Rates from the 1997 Census of Agriculture with County Extension Values or Using 24 Crops and Pastureland Information in the Census.

Sector	Crops†	Region	Nitrogen Removal	Phosphorus Removal	Nitrogen Application	Phosphorus Application	Extension Values for Nitrogen‡	24 Crops and Pasture for Nitrogen¶
Swine	corn	CE	129	24	*185*	*24*	185	110
Swine	c/sb/rye	MA	97	14	*138*	*14*	130	137
Swine	c/sb	MW	139	19	*198*	*19*	155	159
Swine	c/o/al	PA	178	18	*407*	*34*	300	129
Swine	bermuda	SO	150	15	*215*	*15*	300	141
Poultry	bermuda	CE	150	15	*215*	*15*	250	110
Poultry	c/sb/wt	MA	128	20	*183*	*20*	130	137
Poultry	fescue	MW	99	10	*141*	*10*	130	159
Poultry	c/o/al	PA	141	14	*412*	*34*	300	129
Poultry	fescue	SO	99	10	*141*	*10*	175	141

† Cropping system abbreviations: c, corn; sb, soybean; wt, wheat; o, oats; al, alfalfa. Bermuda and fescue refer to the typical hay crop.
‡ Values developed from Mike Clipper's contact with county extension agents.
¶ Values developed by Paul Shriner using 1997 Census of Agriculture and AWMFH.

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Appendix C

Draft Methodology for Estimating Storage Requirements for Option 7

MEMORANDUM

TO: Ron Jordan, EPA

FROM: Deb Bartram, ERG

DATE: 23 January 2001

SUBJECT: Draft Methodology for Estimating Storage Requirements for Option 7

This memorandum presents a draft methodology for the estimation of storage requirements for concentrated animal feeding operations (CAFOs) under Option 7. Option 7 includes all requirements of Option 2 (phosphorus-based application), plus additional restrictions on when manure and manure effluent may be applied.

I Background

Under Option 7, CAFOs would be restricted from applying manure and manure effluent to ground that is frozen or covered with snow. Therefore, these operations would need sufficient capacity in their storage systems to retain the manure and manure effluent that is generated during periods of the year when it cannot be applied.

The National Oceanic and Atmospheric Administration's National Climatic Data Center (NOAA/NCDC) has published freeze/frost data for over 3,100 observation sites in the United States (1). Freezing temperatures are classified based on their effect on plants:

> Light Freeze (29 - 32°F) - tender plants killed, with little destructive effect on other vegetation.
>
> Moderate Freeze (25 - 28°F) - widely destructive effect on most vegetation with heavy damage to fruit blossoms, tender, and semi-hardy plants.
>
> Severe Freeze (24°F and less) - heavy damage to most plants. At these temperatures, the ground freezes solid, with the depth of the frozen ground dependent on the duration and severity of the freeze, soil moisture, and soil type.

The NOAA/NCDC publication contains probability tables for the probable first and last occurrence of freeze-related temperatures for three different freeze temperatures (36°F, 32°F, and 28°F), as well as the probable duration of the freeze-free period occurring between the last spring freeze and the first fall freeze. The temperature data used in their analysis covers 1951 through 1980.

II Determination of Storage Requirements for Option 7

The NOAA/NCDC data can be used to determine the amount of storage capacity that CAFOs would need under Option 7. For this analysis, it was assumed that CAFOs would only be able to apply manure and manure effluent between the time of the last spring frost and the first fall frost (referred to as the "freeze free period"). The freeze free period for the 28°F temperature threshold with a 90% probability

level can be used to estimate the duration of this freeze free period.[6] This assumption is somewhat conservative, since it is possible for temperatures to thaw the ground sufficiently prior to the last frost of the season.

Table 1 presents the duration of the freeze free period for each model farm. The freeze free period was determined for an observation site located within or closest to each model farm county. In addition, the average duration of the freeze free period was calculated for the state in which each model farm is located. The more conservative (i.e., shorter) freeze free period between these two values is bolded in the table and was used to determine storage requirements for that model farm.

Table 2 presents the recommended storage required for each model farm under Option 7. These storage requirements equal 365 days minus the bolded freeze free period from Table 1, and are rounded up to the nearest 45-day increment.

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1. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Climatic Data Center, *Freeze/Frost Data*. Climatography of the U.S. No. 20, Supplement No. 1, January 1988. http://www.ncdc.noaa.gov/ol/documentlibrary/freezefrost/freezefrost.pdf. Accessed April 13, 2000.

[6]The 90% probability level for the freeze free period means there is a 90% chance that the freeze free period may actually extend longer (thereby reducing storage requirements).

Table 1. Summary of Freeze Free Period for Model Farm Locations[1]

Animal Type	Region	Model Farm County (State)	Weather Station	Freeze Free Period	Avg. Freeze Free Period for State
Beef	Pacific	Imperial (CA)	Imperial	351	**257**
	Central	Deaf Smith (TX)	Amarillo	**191**	243
	Midwest	Scott (KS)	Scott	**171**	180
	Mid-Atlantic	Lancaster (PA)	York	167	**161**
	South	Okeechobee (FL)	Avon Park	340	**320**
Dairy	Pacific	Tulare (CA)	Hanford	**256**	257
	Central	Erath (TX)	Hico	**226**	243
	Midwest	Marathon (WI)	Wausau	144	**141**
	Mid-Atlantic	Wyoming (NY)	Batavia	164	**153**
	South	Okeechobee (FL)	Avon Park	340	**320**
Swine	Pacific	Tulare (CA)	Hanford	**256**	257
	Central	Yuma (CO)	Wray	147	**118**
	Midwest	Sioux (IA)	Hawarden	**148**	161
	Mid-Atlantic	Duplin (NC)	Goldsboro	218	**196**
	South	Oglethorpe (GA)	Athens WSO	**226**	229
Poultry	Pacific	Fresno (CA)	Fresno WSO	289	**257**
	Central	Shelby (TX)	Henderson	**241**	243
	Midwest	Barry (MO)	Seligman	187	**184**
	Mid-Atlantic	Wicomico (MD)	Salisbury	201	**190**
	South	Benton (AR)	Benton	**204**	212

[1] The freeze free period used in the analysis is defined as the period of time when temperatures will stay above 28°F with a 90% probability that the warm temperature period will actually be longer than what is stated.

Table 2. Required Storage Days by Animal Type and Region[1]

Animal Type	Region				
	Pacific	Central	Midwest	Mid-Atlantic	South
Beef	135	180	225	225	45
Dairy	135	180	225	225	45
Swine	135	270	225	180	180
Poultry	135	135	180	180	180

[1]Required storage days are calculated as 365 days minus the freeze free period shown in Table 1, rounded up to the nearest 45-day increment.

Appendix D: Frequency Factors of Compliance for Cost Items

Broilers: Percent of Facilities That Already Incur Costs

Component	Mid-Atlantic		South		Source
	300-1,000 AU	>1,000 AU	300-1,000 AU	>1,000 AU	
Certification of manure applicators	16.6	12.1	0	0	State Regs
Already assess GW link to SW	0	0	0	0	EPA
GW well installation	76.09*	76.09*	77.55*	77.55*	Sobecki and Clipper, 1999
SW monitoring; O&M	0	0	0	0	State Regs
Soil auger	16.6	12.1	0	23.1	State Regs
Manure sampler	16.6	12.1	0	0	State Regs
Scales (2) for spreader calibration	16.6	12.1	0	0	State Regs
Initial NMP development	16.6	12.1	0	23.1	State Regs
NMP on-farm recurring	16.6	12.1	0	0	State Regs
Soil testing	16.6	12.1	0	23.1	State Regs
Record keeping	16.6	12.1	0	23.1	State Regs
Calibration of manure spreader	16.6	12.1	0	0	State Regs
Manure testing	16.6	12.1	0	0	State Regs
GW sampling	76.09*	76.09*	77.55*	77.55*	Sobecki and Clipper, 1999
Mortality - composting and O&M	76.09*	76.09*	77.55*	77.55*	Sobecki and Clipper, 1999
Adequate storage	30	30	30	30	EPA
Storm water diversions and O&M	0	0	0	23.1	State Regs
Stream buffer and O&M	0	0	0	0	State Regs
Visual inspection	0	0	0	23.1	State Regs
Feeding strategies	100	100	100	100	EPA

Note: GW = ground water, SW = surface water, NMP = nutrient management planning, O&M = operation and maintenance.

* Represents the percentage of facilities that will not incur this cost due to their location.

Turkeys: Percent of Facilities That Already Incur Costs

Component	Mid-Atlantic		Midwest		Source
	300-1,000 AU	>1,000 AU	300-1,000 AU	>1,000 AU	
Certification of manure applicators	0.4	1.3	0	0	State Regs
Already assess GW link to SW	0	0	0	0	EPA
GW well installation	76.09*	76.09*	72.54*	72.54*	Sobecki and Clipper, 1999
SW monitoring; O&M	0	0	0	0	State Regs
Soil auger	0.4	1.3	0	10.1	State Regs
Manure sampler	0.4	1.3	0	10.1	State Regs
Scales (2) for spreader calibration	0.4	1.3	0	0	State Regs
Initial NMP development	0.4	1.3	0	0	State Regs
NMP on-farm recurring	0.4	1.3	0	0	State Regs
Soil testing	0.4	1.3	0	10.1	State Regs
Record keeping	0.4	1.3	0	10.1	State Regs
Calibration of manure spreader	0.4	1.3	0	0	State Regs
Manure testing	0.4	1.3	0	10.1	State Regs
GW sampling	76.09*	76.09*	72.54*	72.54*	Sobecki and Clipper, 1999
Mortality - composting and O&M	76.09*	76.09*	72.54*	72.54*	Sobecki and Clipper, 1999
Adequate storage	75	75	25	25	EPA
Storm water diversions and O&M	0	0	0	0	State Regs
Stream buffer and O&M	0	0	0	0	State Regs
Visual inspection	0	0	0	0	State Regs
Feeding Strategies	5	5	5	5	EPA

Note: GW = ground water, SW = surface water, NMP = nutrient management planning, O&M = operation and maintenance.

* Represents the percentage of facilities that will not incur this cost due to their location.

Layers (Wet and Dry-All Sizes): Percent of Facilities That Already Incur Costs

Component	Midwest	Mid-Atlantic	South	Source
Certification of manure applicators	5	5	5	UEP/UEA
Already assess GW link to SW	10.9	12.7	40	UEP/UEA
GW well installation	72.54*	76.09*	77.55*	Sobecki and Clipper, 1999
SW monitoring; O&M	0	0	0	
Soil auger	34.3	63.2	50	UEP/UEA
Manure sampler	70.6	56.2	75	UEP/UEA
Scales (2) for spreader calibration	61.8	29.6	50	UEP/UEA
Initial NMP development	69.4	56.7	75	UEP/UEA
NMP on-farm recurring	69.4	56.7	75	UEP/UEA
Soil testing	34.3	63.2	50	UEP/UEA
Record keeping	99	99	99	UEP/UEA
Calibration of manure spreader	61.8	64	50	UEP/UEA
Manure testing	70.6	56.2	75	UEP/UEA
GW sampling	72.54*	76.09*	77.55*	Sobecki and Clipper, 1999
Mortality composting and O&M	72.54*	76.09*	77.55*	Sobecki and Clipper, 1999
Adequate storage	72.54*	76.09*	77.5*5	Sobecki and Clipper, 1999
Storm water diversions and O&M	80.9	69.3	70	UEP/UEA
Stream buffer and O&M	80.9	69.3	70	UEP/UEA
Visual inspection	25	25	25	AFO strategy
Lagoon liner and O&M/wet layers	72.54*	76.09*	77.55*	Sobecki and Clipper, 1999
Lagoon depth marker/wet layers	0	0	0	
Feeding strategies	0	0	0	

Note: GW = ground water, SW = surface water, NMP = nutrient management planning, O&M = operation and maintenance.
* Represents the percentage of facilities that will not incur this cost due to their location.

Swine: Percent of Facilities That Already Incur Costs

Component	Midwest		Mid-Atlantic		Source
	< 2500 head	>2500 head	< 2500 head	>2500 head	
Certification of manure applicators	0	27.5	0	27.1	NAHMS
Already assess GW link to SW	1.1	23.1	7.4	12.3	NAHMS
GW well installation	72.54*	72.54*	76.09*	76.09*	Sobecki and Clipper, 1999
SW monitoring	4.6	27.9	5.7	17.9	NAHMS
Soil auger	0	94.0	0	94.0	NPPC, 1998
Manure sampler	0	71.9	0	71.9	NPPC, 1998
Scales (2) for spreader calibration	0	71.9	0	71.9	NPPC, 1998
Initial NMP development	10.7	46.9	24.9	69.4	NAHMS
NMP on-farm recurring	10.7	46.9	24.9	69.4	NAHMS
Soil testing	90	94.0	90	94.0	NPPC, 1998
Record keeping	71.0	98.9	93.1	99.9	NAHMS
Calibration of manure spreader	0	99.0	0	99.0	AFO strategy
Manure testing	2.1	38.3	6.1	29.9	NAHMS
GW sampling	72.54*	72.54*	76.09*	76.09*	Sobecki and Clipper, 1999
Mortality - composting and O&M	72.54*	72.54*	76.09*	76.09*	Sobecki and Clipper, 1999
Adequate storage	72.54*	72.54*	76.09*	76.09*	Sobecki and Clipper, 1999
Storm water diversions and O&M	0	50.0	0	50.0	
Stream buffer and O&M	0	99.0	0	99.0	
Visual inspection	0	25.0	0	25.0	AFO strategy
Lagoon liner and O&M	72.54*	72.54*	76.09*	76.09*	Sobecki and Clipper, 1999
Lagoon depth marker	0	99.0	0	99.0	AFO strategy
Feeding strategies (4 diets)	14.9	67.7	17.8	72.7	NAHMS
Solid - liquid separator	7.7	0	2.3	1.5	NAHMS

Note: GW = ground water, SW = surface water, NMP = nutrient management planning, O&M = operation and maintenance.

* Represents the percentage of facilities that will not incur this cost due to their location.

Appendix E

Revised Transportation Distances for Category 2 and 3 Type Operations

To: Paul Shriner, EPA
From: Jed Waddell, Jon Harcum, & George Townsend, Tetra Tech, Inc.
Subject: Revised--Revised Transportation Distances for Category 2 and 3 Type Operations
Date: January 7, 2000

This memo revises the memo from July 8, 1999 for transportation distances for category 2 and 3 type operations. Due to lack of information from the manure program on county manure excesses and deficits from the 1997 Census of Agriculture data, a new approach was identified during the January 7, 2000 meeting with EPA OST and OWM, Tetra Tech, and ERG.

Category 2 type operations, determined by manure generation and nutrient application (based on 1997 Census of Agriculture Queries), have different transportation distances depending on whether manure is applied on a nitrogen or phosphorus based application scenario. In the event that an operation has insufficient land to apply manure on an agronomic nitrogen basis, equation 1 was used to estimate transportation distance:

$$N_{distance} = ICD \qquad [1]$$

where $N_{distance}$ is the transportation distance for category 2 type operation with manure applied at agronomic N rates (miles) and ICD is the in-county transportation distance (miles) from table 2.

Transportation distances for category 2 type operations with manure applied on an agronomic phosphorus basis is shown in equation 2:

$$P_{distance} = ICD + \frac{(OCD - ICD)}{3} \qquad [2]$$

where $P_{distance}$ is the transportation distance for category 2 type operations with manure applied at agronomic P rates (miles), OCD is the out-of county transportation distance (miles) from table 2, and ⅓ is a factor that takes into account that some operations may have to transport out of county while others may not.

Category 3 type operations have no land and it is assumed that all are already incurring costs for transportation on an agronomic nitrogen basis. The incremental transportation distance for switching to an agronomic phosphorus basis is depicted in equation 3:

$$P3_{distance} = \frac{(OCD - ICD)}{3} \qquad [3]$$

where $P3_{distance}$ is the transportation distance (miles).

These equations have been used to calculate regional transportation distances. The results of the equations are shown in table 1. The variables OCD and ICD were obtained from the previous memo and are shown in Table 2.

Table 1. Transportation Distances for Category 2 and 3 type Operations for the Various Regions in the United States.

Region	Category 2		Category 3	
	N Basis	P Basis	N Basis	P Basis
Northeast, Appalachian	5.5	30.5	0.0	25.0
Southern, Delta	6.0	14.5	0.0	8.5
Northern Plains, Lake States, Corn Belt	6.5	10.0	0.0	3.5
Pacific	12.5	21.5	0.0	9.0
Mountain, Southern Plains	11.0	16.5	0.0	5.5

All values rounded to the nearest ½ mile.

Previous Memo "Revised Transportation for Category 2 and 3 Type Operations" June 1, 1999

This memo revises the information for Category 2 and Category 3 type farms regarding the distance needed to transport manure by grouping various regions. Category 2 type operations require transportation of excess manure inside the current county boundaries while Category 3 operations require transportation outside of the county. The procedure was identical to that provided in a Tetra Tech memo (April 21, 1999, revised June 1, 1999). Note that in-county and out-of-county distances are rounded to the nearest 0.5 and 1.0 mile, respectively.

Table 2. In-County Transport Distances and Out-of-County Transport Distances for the Various Regions in the United States.

Region	In-County Transport (mi)	Out of County Transport (mi)
Northeast, Appalachian	5.5	81
Southern, Delta	6.0	32
Northern Plains, Lake States, Corn Belt	6.5	17*
Pacific	12.5*	39*
Mountain, Southern Plains	11.0	27 **

* no changes
** not previously estimated since poultry and swine were not modeled in Mountain or Southern Plains states.

Appendix F

Transportation Distance for Category 2 and 3 Type Operations

To: Paul Shriner. EPA
From: George Townsend, Jon Harcum, and Jed Waddell, Tetra Tech, Inc.
Subject: Transportation Distance for Category 2 and 3 Type Operations
Date: April 21, 1999, revised June 1, 1999
Contract: EPA Contract 68-C7-0014, Work Assignment 27

This memo summarizes information for Category 2 and Category 3 type farms about the distance needed to transport manure. Category 2 type operations require transportation of excess manure

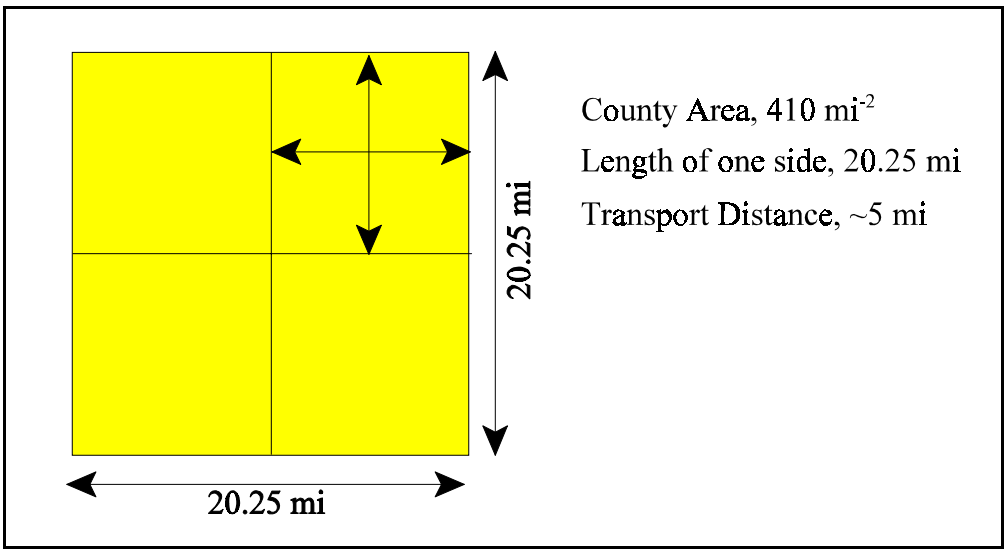

Figure 1. Example calculation of In-County Transport Distances.

inside the current county boundaries while Category 3 operations require transportation outside of the county. Distances for in-county and out-county transport were calculated based on an average county size for each region (see table 1). To further simplify transportation distance, a square county was assumed. For in-county (off-farm) transport, it was assumed that transport distance was 25 percent of the square root of the average area of the county (see figure). The range of in-county transportation distances are shown in the table.

Out of county transportation distances were calculated using a two-thirds centroid-to-centroid distance. The two-thirds centroid was arbitrarily chosen since several surrounding counties may be able to accept manure; transportation is not limited to the nearest county (for which a unit centroid-to-centroid distance would be applied).

The distance for out-of-county export assumed a phosphorus based application using Lander's results for manure production. In review of Lander's nitrogen based analysis, the only region with manure excesses was in the Southern region. Thus, to simplify calculation of transportation distances, the phosphorus based transport distance was applied only to the Southern region for

nitrogen based manure application. Lander's phosphorus excess map was used to calculate distances for the key areas of manure production. For example, in the Northeast, the key areas are Delmarva and Southeastern Pennsylvania. In Delmarva, the distance from the centroid of manure generation to the centroid of the furthest county is 114 miles and the manure excess is 9.6 million lbs of phosphorus. In Southeastern Pennsylvania, Lancaster county is the worst case with an estimated distance of 56 miles and manure excess of 5.1 million pounds of phosphorus. In other counties the distance is between 12 and 30 miles with a manure excess of 0.6 million lbs of P. Using a weighted average, the worst case transport distance for the three regions in Delmarva and Southeastern Pennsylvania was 91 miles. Using two-thirds of this value, the transportation distance for the Northeast became 61 miles. Thus, in regions with several smaller adjacent counties with out-of-county transportation requirements, the distance is actually greater than regions with larger counties (those without adjacent counties with excess manure).

Table 1. Average County Size, In-County Transport Distances, and Out-of-County Transport Distances for the Various Regions in the United States

Region	Average County Size	In-County Transport	Out of County Transport
	mi^2 [A]	mi	mi
Northeast	689	6.5	61
Appalachian	410	5.0	88
Southern	567	6.0	37
Delta	662	6.5	17
Northern Plains	970	8.0	17
Lake States	820	7.0	17
Corn Belt	524	5.5	17
Pacific	2422	12.5	39
Mountain	3073	14.0	—*
Southern Plains	1010	8.0	—*

* No out-of-county transport required in these regions.

Appendix G

Equations Used in Model Feedlot Costs Program

MODEL FACILITY

Swine Farrow-to-Finish Appachalian

Size of Operation	Constant read from input file
Nutrient Management Basis	Constant read from input file
Number of miles excess manure must be transported	Constant read from input file
Number of facilities in this category	Constant read from input file
Average acres of cropland available on farm	Constant read from input file
Average number of head per facility	Constant read from input file

CALCULATIONS

Volume of fresh Manure	manvol=nohead*animwt*mcvolume/1000*365
Mass of fresh Manure	manwt=nohead*animwt*mcweight/1000*365
Nitrogen produced	mann=nohead*animwt*mcn/1000*365
Phosphorus produced	manp=nohead*animwt*mcp/1000*365.

Number of acres needed to apply Phosphorus	if (NMBase.eq.' P ') then
	totac=manp/(cornyld*cornpup)*mcpeff
	else
	totac=mann/(cornyld*cornnup)*mcneff

Amount of N required on farm	farmn=cornyld*cornnup*farmsz
Amount of P required on farm	farmp=cornyld*cornpup*farmsz

NUTRIENT MANAGEMENT PLAN	FIXED ANNUAL
1)Fixed one time costs	
Training and certification for manure appl.	Constant read from input file
Assessment of crop field/GW link to SW	Constant read from input file
Groundwater monitoring well installation	Constant read from input file
Soil Auger	Constant read from input file
Manure Sampler	Constant read from input file
Scale to calibrate manure spreader	Constant read from input file
2)Non-annual reoccuring costs	
CNMP development (every 5 years)	cnmp=totac*nmprate
Manure testing (every 3 years)	

```
if (animal.eq.'Swin ') then
        numhouse=0
else if (animal.eq.'Chic ')then
        if (nohead.le.25000) then
                numhouse=1
        else
                numhouse=aint(nohead/25000.)
        endif
else
        numhouse=aint(0.00016*nohead)
endif

mantest=(1+0.25*numhouse)*labor+(1+numhouse)*mananal
```

```
  Soil testing     (every 3 years)                    Soiltest=(totac/soilsampfreqlow*soilsamptimelow*la
                                                      bor)+&
                                                          (totac*soilsampfreqlow*soilanal)
 3)Annual Costs
  Record keeping                                      Constant read from input file
  Calibrate manure spreader                           calibrate=calibann*labor+tarp
  O&M for groundwater monitoring                      gwmon=2*(gwtime*labor +
                                                      wateranal)+gwinst*maint

FACILITY UPGRADES
 1)Fixed one-time costs
  Mortality composting facility          mortfac=nohead/deadlen*deadwt*pctdead*2.*storfaccost*1.5
  Storage (for poultry litter)                     if (animal.ne.'Swin ') then
                                                      shavvol=(shavdep/12*housarea*litfreq*numhouse)
                                                      dilman=shavvol+manvol
                                                      storage=dilman/4*storfaccost
                                             else
                                                      storage=0
                                                   endif
  Lagoon depth marker                        if (animal.ne. 'Swin ') then
                                                            lagdep=0
                                                        else
                                                            lagdep=lagdepmark
                                                        endif
  Divert storm water around structures             if (animal.eq. 'Swin ') then
                                                      dilman=manvol*3.
                                                      endif
                                swdivert=lagoon(animal,dilman,divslop,divtop,earthmov,& nohead,animwt)

                                         Function
                                         lagoon(animal,dilman,divslop,divtop,earthmov,nohead,animwt)
                                                      real dilman,divslop,divtop,earthmov,a,b,c,&
                                                            topwidth,depth,volume,sides,animwt
                                                      integer nohead
                                                      character*5 animal

                                                      sides=2. 2 sides for berming
                                                      if (animal.eq.'Swin ') then
                                                            volume=2.5*nohead*animwt
                                                      else
                                                            volume=dilman
                                                      endif
                                                      a=1. a is the ratio of top length to top width
                                                      depth=11. lagoon depth of 11 feet

                                                      b= -1*(divslop*depth+a*divslop*depth)
                                                      c= divslop**2. * depth**2. - volume/depth

                                                      topwidth=(-b+(b**2-4*a*c)**.5)/(2.*a)
                                                      lagoon=21./27. *(sides*(topwidth+20.))*earthmov
                                         End Function lagoon

 2)Annual Reoccurring Costs
  Visual inspection                          visinsp=visinsptime*52*labor
  Mortality operation and maintenance        mortann=90.*(tractor+labor)+maint*mortfac
  Moving manure out of house to storage      moveman=((stortrans*labor+stortrans*tractor)*numhouse)
                                                                  +maint*storage
```

LAND APPLICATION

Erosion Control

Calculate the miles of stream (0.976 miles of stream/square mile of land in US)

Cost to take land out of production

Note that the value "2" assumes river running through middle of farm

```
erosinit=farmsz*landriver/1000*vegcover*2
erosann=farmsz*landriver/1000*(landrent+maint*erosinit)*2
```

1)Incorporation

Initial costs to purchase disk harrow	Constant read from input file
Annual O&M for manure incorporation	LandApp= disktime*(labor+tractor)*totac.+diskharrow*maint

REDUCING EXCESS NUTRIENTS

S1)Feeding Strategies

N produced after feeding strategy implementation	(mann*(1-fsnred))
N remaining	FSNremain= (mann)-farmn -(mann*FSNred)
P produced after feeding strategy implementation	(manp*(1-fspred))
P remaining	FSPremain= (manp)-farmp -(manp*FSPred)

Acreage required for Phosphorus disposal

```
if (nmbase.eq.'   P ')then
FSacre=(manp*(1-fspred))/(cornyld*cornpup)*mcpeff
else
        FSacre=(mann*(1-fsnred))/(cornyld*cornnup)*mcne
        ff
                endif
```

Cost of implementing feeding strategies

```
if (animal.eq.'Swin ') then
        FScost=nohead*FScostpig
else
        FScost=nohead*FScostchi
endif
```

S2)Hauling with Feeding Strategies

Amount of manure to haul	1241405. gallons
Cost of hauling	$ 16596.

```
if (FSacre.le.farmsz) then
  Haul=0
  haulamount=0
else
  if (animal.eq.'Swin ') then
        haulpct=1-real(farmsz)/real(fsacre)
        haulamount=dilman*haulpct
        Haul=(haulamOUNT/7.48)*HAULLIQ+haulliqadd*(transport-1)
  else
        haulpct=1-real(farmsz)/real(fsacre)
        haulamount=manwt*haulpct
        if (transport.lt.90) then
                haul= HAULAMOUNT/2000*haulS1*transport
        elseif (transport.gt.180) then
                haul=haulamount/2000*haulS3*transport
        else
                haul=haulamount/2000*haulS2*transport
        endif
  endif
endif
```

S3)Hauling without Feeding Strategies

Amount of manure to haul 1336111. gallons

Cost of hauling $17863.

```
if (totac.le.farmsz) then
    Haulnofs=0
    haulamountnofs=0
else
    if (animal.eq.'Swin ') then
        haulpct=1-real(farmsz)/real(totac)
        haulamountnofs=dilman*haulpct

Haulnofs=(haulamountnofs/7.48)*HAULLIQ+haulliqadd*(transport-1)
    else
        haulpct=1-real(farmsz)/real(totac)
        haulamountnofs=manwt*HAULPCT
        if (transport.lt.90) then
            haulnofs= HAULAMOUNTnofs/2000*haulS1*transport
        elseif (transport.gt.180) then
            haulnofs=haulamountnofs/2000*haulS3*transport
        else
            haulnofs=haulamountnofs/2000*haulS2*transport
        endif
    endif
endif
```

S4)Separation and Hauling with Feeding Strategies

Initial cost to install and set-up separator sepinit=shfsamttot*(1+sepsaffac)*tankcost+separator &
+pipelen*pipecost+seplabor*labor

Amount of N in separated material shfsN=mann*sepn*(1-fsnred)

Amount of P in separated material shfsP=manp*sepp*(1-fspred)

```
Amount of manure to haul    if (nmbase.eq.'   P ')then
                                SHFSacre=shfsP/(cornyld*cornPup)*mcpeff
                            else
                                SHFSacre=shfsN/(cornyld*cornNup)*mcneff
                            endif
                            shfsamttot=manvol*(1-mcmoist)*sepeff/sepsolid
                                sephaulfsamt=shfsamttot*(1-farmsz/shfsacre)
```

Cost to haul separated manure sephaulfs=(sephaulfsamt)/7.48*HAULLIQ+haulliqadd*(transport-1)

S5)Separation and Hauling without Feeding Strategies

Initial cost to install and set-up separator sepinit=shfsamttot*(1+sepsaffac)*tankcost+separator &
+pipelen*pipecost+seplabor*labor

Amount of N in separated material shn=mann*sepn

Amount of P in separated material shP=manp*sepp

```
Amount of manure to haul    if (nmbase.eq.'   P ')then
                                SHacre=shP/(cornyld*cornPup)*mcpeff
                            else
                                SHacre=shN/(cornyld*cornNup)*mcneff
                            endif
                                if (SHacre.le.farmsz) then
                                    sephaul=0
                                else
                                    sephaulamt=shfsamttot*(1-farmsz/shacre)
```

Cost to haul separated manure sephaul=(sephaulamt)/7.48*HAULLIQ+haulliqadd*(transport-1)

Appendix H

Variable Names Used in Model Feedlot Costs Program

Variable Name	Variable Represents
amort	Amortization rate, percent
Animal	Type of animal (e.g., swine, chicken, or turkey)
animwt	Average weight of animal
assess	Assessment of crop field/ground water link to surface water ($)
calibann	Time required annually to calibrate a manure applicator
calibinit	Initial costs for manure calibration (i.e., scale)
calibrate	Calibrating manure spreader ($)
centerpivot	Cost to set up a center pivot irrigation device
cnmp	Obtaining a certified CNMP every 5 years ($)
cornyld	Corn yield (bushels/acre)
cornnup	Corn nitrogen uptake (lb/bushel)
cornpup	Corn phosphorus uptake (lb/bushel)
cpann	Annual costs to operate center pivot irrigation device
cpinit	Initial costs to set up center pivot irrigation device
deadlen	Length of animal life
deadwt	Average weight of animals at mortality
dilman	Volume of manure diluted with water (swine) or wood shavings (poultry)
diskharrow	Cost to purchase a new disk harrow
disktime	Time required to disk one acre
divtop	Storm water diversion berm top width
divhei	Storm water diversion berm height
divslp	Storm water diversion berm side slope
earthmov	Cost to move one cubic yard of earth
farmac	Farm size minus buildings and non-arable land (acres)
farnesc	Arable acres on farm (farm size minus buildings and erosion and sediment controls)
farmp	Amount of P required on farm
farmn	Amount of N required on farm

farmsz	average acres of cropland available for nutrient management planning
fsacre	Off-farm acreage required for land application of remaining nutrients
fscost	Cost of feeding strategies
fscostpig	Cost per animal required to implement feeding strategy
fsnremain	N remaining after feeding strategy implementation
fsnred	Feeding strategy N reduction efficiency
fspremain	P remaining after feeding strategy implementation
fspred	Feeding strategy P reduction efficiency
fstotac	Total acres required to land apply manure after imposing feeding strategies
gwinst	Installation of ground water monitoring wells ($)
gwmon	O&M for ground water monitoring
gwtime	Time required for ground water monitoring well sampling (hours)
haul	Cost to haul manure influenced by feeding strategies
haulamount	Amount of manure to apply off-farm in gallons (swine) or tons (poultry)
haulliq	Cost to haul and apply liquid manure less than 1 mile
haulliqadd	Additional cost to haul liquid manure
haulnosep	Cost to haul manure without imposing feeding strategies
haulamountnosep	Amount of manure to apply off-farm without feeding strategies
hauls1	Cost to haul solid manure less than 90 miles
hauls2	Cost to haul manure 90 to 180 miles
hauls3	Cost to haul manure more than 180 miles
housearea	Area of house
incorp	Incorporation of manure
labor	General labor rate ($/hour)
lagdepmark	Cost of lagoon depth marker
lagdepth	Construction and installation of lagoon depth marker
landapp	Cost to disk land required for land application of manure
landrent	Cost for taking land for erosion and sediment control out of production
landriver	Ration of stream length to land area (/1000)
litclean	Time allowance for litter storage cleaning
litfreq	Rate of litter storage cleaning

maint	Standard maintenance and repairs, percent
manaddsamp	Time required for additional manure samples
mananal	Cost of manure nutrient analysis
manappcap	Capacity of manure application tank (gallons)
manappinj	Cost of injectors for manure application tank
manapptank	Cost of tank for manure application
maninjann	Annual cost for injection of manure
maninjinit	Initial cost for injection of manure
manfirstsamp	Time required to set up and sample manure
manp	Phosphorus produced in manure annually (lb P)
mann	Nitrogen produced in manure annually (lb N)
mansamp	Cost required to purchase and fabricate a manure sampler
mansurfinit	Initial cost for surface application of manure
mansurfann	Annual costs for surface application of manure
mantankapp	Time required to apply manure (hours)
mantankhaul	Time required to haul liquid manure (hours/mile)
mantankload	Time required to load manure application tank (hours)
mantest	Manure testing every 3 years
manvol	Volume of manure produced annually (ft^3)
manwt	Annual weight of manure
mck	Manure characteristics, potassium in manure (lb/day/1000#)
mckeff	Manure characteristics, efficiency of potassium application to field
mcmoist	Manure characteristics, moisture content of fresh manure
mcn	Manure characteristics, nitrogen in manure (lb/day/1000#)
mcneff	Manure characteristics, efficiency of nitrogen application to field
mcp	Manure characteristics, phosphorus in manure (lb/day/1000#)
mcpeff	Manure characteristics, efficiency of phosphorus application to field
mcvolume	Manure characteristics, volume of manure produced (ft^3/day/1000#)
mcweight	Manure characteristics, weight of manure produced (lb/day/1000#)
mortann	Annual operating and maintenance costs for mortality composting facility
mortfac	Cost of building a mortality composting facility

moveman	Cost of moving manure to storage (for poultry litter)
NMBase	Basis for nutrient management (i.e., nitrogen or phosphorus)
nmprate	Rate charged by certified CNMP provider ($/acre)
nofac	Number of facilities in a given region
nohead	Number of head
numhouse	Number of houses
Opertype	Type of operation (e.g. farrow-to-finish, turkeys with fresh litter)
pctdead	Percentage of birds that die in one turnover of animals
pipcost	Cost of pipe
pipelen	Length of pipe to connect lagoon to separator
plabor	Professional labor rate ($/hour)
ptax	Property tax, percent
reckeep	Record keeping and reporting ($)
Region	Region containing the model feedlot (e.g., Southeast, Corn Belt)
RMCF	Recoverable manure correction factor
separator	Cost of solids separation unit (e.g., static inclined screen)
sepeff	Solid-liquid separation removal efficiency
sepinit	Initial costs to construct and set up liquid-solid separator
sephaul	Cost to separate and haul manure without imposing feeding strategies
sephaulamt	Amount of manure to haul without imposing feeding strategies
sephaulfs	Cost to separate and haul manure after imposing feeding strategies
sephaulfsamt	Amount of manure to haul off-farm after separation and feeding strategies
seplabor	Time required to set up separation facility
sepn	Amount of N transferred to storage after separation
sepp	Amount of P transferred to storage after separation
sepsaffac	Safety factor to increase size for solids storage facility
sepsol	Solids content of separated manure
shavcost	Cost of bulk wood shavings
shavdep	Depth of shavings applied to poultry houses
shavvol	Volume of shavings
shfsacre	Acreage required to apply separate manure after imposing feeding strategies

soilauger	Cost to purchase a soil auger
soilsampfreqlow	Frequency of soil sampling - low end (acres/sample)
soilsampfreqhi	Frequency of soil sampling - site-specific farming (acres/sample)
soilsamptimelow	Time required to take soil sample - low end
soilsamptimehi	Time required to take soil sample - site-specific farming
soiltest	Soil testing every 3 years ($)
storage	Construction of extra storage (for poultry manure) ($)
storfaccost	Square foot cost of 4 foot high litter storage facility for poultry waste
stortrans	Time allowance for litter transfer to storage
swdivert	Clean water diversion from storage facilities
tankcost	Cost to build a steel storage tank for separated manure
tarp	Tarp to calibrate manure applicator
totac	Acreage required for disposal of "as is" manure
train	Training/certification for land application of manure ($)
transport	number of miles excess manure will need to be transported
turns	Animal turnover rate
vegcover	Cost to establish permanent vegetative cover ($/acre)
visinsp	Visual inspection of facilities
visinsptime	Time required to visually inspect waste storage, storm water diversion, etc..
wateranal	Cost of water sample testing

Appendix I

Regulatory Compliance Costs

Regulatory Compliance Costs for Swine (FF, farrow-to-finish; GF, grower-finisher) Industry

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3 yr rec	5 yr rec
1	Swine	Liquid	FF	Mid-Atlantic	1	187	Large1	640	736	181	253	0
1	Swine	Liquid	FF	Midwest	1	868	Large1	635	742	180	254	0
1	Swine	Liquid	FF	Mid-Atlantic	2	31	Large1	11,597	668	397	181	153,926
1	Swine	Liquid	FF	Midwest	2	145	Large1	11,495	739	395	251	979
1	Swine	Liquid	FF	Mid-Atlantic	3	35	Large1	118,315	580	22,431	0	0
1	Swine	Liquid	FF	Midwest	3	163	Large1	116,232	580	22,021	0	0
1	Swine	Liquid	FF	Mid-Atlantic	1	144	Large2	1,139	1,340	200	905	0
1	Swine	Liquid	FF	Midwest	1	306	Large2	1,040	1,228	192	762	0
1	Swine	Liquid	FF	Mid-Atlantic	2	69	Large2	394,727	808	8,613	331	0
1	Swine	Liquid	FF	Midwest	2	147	Large2	24,943	976	664	498	547,498
1	Swine	Liquid	FF	Mid-Atlantic	3	86	Large2	554,131	580	108,310	0	0
1	Swine	Liquid	FF	Midwest	3	182	Large2	448,511	580	87,492	0	0
1	Swine	Liquid	FF	Mid-Atlantic	1	304	Medium1a	1,242	672	392	214	0
1	Swine	Liquid	FF	Midwest	1	2731	Medium1a	1,196	644	567	184	0
1	Swine	Liquid	FF	Mid-Atlantic	2	22	Medium1a	7,500	689	526	232	0
1	Swine	Liquid	FF	Midwest	2	194	Medium1a	7,419	709	723	252	0
1	Swine	Liquid	FF	Mid-Atlantic	3	34	Medium1a	33,260	580	5,745	0	0
1	Swine	Liquid	FF	Midwest	3	310	Medium1a	32,228	580	5,742	0	0
1	Swine	Liquid	FF	Mid-Atlantic	1	203	Medium1b	1,449	745	440	291	0
1	Swine	Liquid	FF	Midwest	1	1821	Medium1b	1,370	695	596	237	0
1	Swine	Liquid	FF	Mid-Atlantic	2	14	Medium1b	8,999	685	554	227	55,197
1	Swine	Liquid	FF	Midwest	2	129	Medium1b	8,883	709	752	252	0
1	Swine	Liquid	FF	Mid-Atlantic	3	23	Medium1b	54,889	580	9,988	0	0
1	Swine	Liquid	FF	Midwest	3	207	Medium1b	53,024	580	9,820	0	0
1	Swine	Liquid	FF	Mid-Atlantic	1	135	Medium2	1,621	816	485	365	0
1	Swine	Liquid	FF	Midwest	1	696	Medium2	1,526	750	627	294	0
1	Swine	Liquid	FF	Mid-Atlantic	2	13	Medium2	10,285	720	600	264	89,706
1	Swine	Liquid	FF	Midwest	2	68	Medium2	10,266	752	801	297	0

Cost for Swine Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3 yr rec	5 yr rec
1	Swine	Liquid	FF	Mid-Atlantic	3	20	Medium2	75,688	580	14,073	0	0
1	Swine	Liquid	FF	Midwest	3	104	Medium2	75,270	580	14,189	0	0
1	Swine	Liquid	GF	Mid-Atlantic	1	288	Large1	643	738	181	255	0
1	Swine	Liquid	GF	Midwest	1	356	Large1	634	740	180	252	0
1	Swine	Liquid	GF	Mid-Atlantic	2	89	Large1	11,666	648	398	159	207,255
1	Swine	Liquid	GF	Midwest	2	110	Large1	11,452	699	394	209	85,939
1	Swine	Liquid	GF	Mid-Atlantic	3	81	Large1	119,757	580	29,432	0	0
1	Swine	Liquid	GF	Midwest	3	101	Large1	115,367	580	28,308	0	0
1	Swine	Liquid	GF	Mid-Atlantic	1	154	Large2	883	975	189	511	0
1	Swine	Liquid	GF	Midwest	1	78	Large2	920	1,050	188	576	0
1	Swine	Liquid	GF	Mid-Atlantic	2	180	Large2	19,006	760	545	279	498,323
1	Swine	Liquid	GF	Midwest	2	92	Large2	20,421	892	573	410	342,942
1	Swine	Liquid	GF	Mid-Atlantic	3	94	Large2	290,778	580	73,215	0	0
1	Swine	Liquid	GF	Midwest	3	48	Large2	327,157	580	82,531	0	0
1	Swine	Liquid	GF	Mid-Atlantic	1	247	Medium1a	1,281	685	401	227	0
1	Swine	Liquid	GF	Midwest	1	1432	Medium1a	1,222	651	571	191	0
1	Swine	Liquid	GF	Mid-Atlantic	2	30	Medium1a	7,735	639	502	180	41,347
1	Swine	Liquid	GF	Midwest	2	171	Medium1a	7,586	653	698	194	0
1	Swine	Liquid	GF	Mid-Atlantic	3	51	Medium1a	37,029	580	8,304	0	0
1	Swine	Liquid	GF	Midwest	3	294	Medium1a	34,999	580	7,986	0	0
1	Swine	Liquid	GF	Mid-Atlantic	1	44	Medium1b	1,449	746	440	292	0
1	Swine	Liquid	GF	Midwest	1	256	Medium1b	1,360	692	595	234	0
1	Swine	Liquid	GF	Mid-Atlantic	2	5	Medium1b	41,311	639	1,327	180	0
1	Swine	Liquid	GF	Midwest	2	30	Medium1b	8,755	651	720	191	50,244
1	Swine	Liquid	GF	Mid-Atlantic	3	9	Medium1b	54,985	580	12,882	0	0
1	Swine	Liquid	GF	Midwest	3	53	Medium1b	51,801	580	12,268	0	0
1	Swine	Liquid	GF	Mid-Atlantic	1	122	Medium2	1,626	818	487	368	0
1	Swine	Liquid	GF	Midwest	1	314	Medium2	1,520	748	625	292	0
1	Swine	Liquid	GF	Mid-Atlantic	2	24	Medium2	10,311	709	594	253	100,722

Cost for Swine Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3 yr rec	5 yr rec
1	Swine	Liquid	GF	Midwest	2	62	Medium2	10,199	734	790	278	15,133
1	Swine	Liquid	GF	Mid-Atlantic	3	29	Medium2	76,299	580	18,320	0	0
1	Swine	Liquid	GF	Midwest	3	74	Medium2	74,370	580	18,027	0	0
2	Swine	Liquid	FF	Mid-Atlantic	1	112	Large1	674	2,105	202	1,729	0
2	Swine	Liquid	FF	Midwest	1	521	Large1	657	2,251	193	1,832	0
2	Swine	Liquid	FF	Mid-Atlantic	2	19	Large1	85,724	1,134	14,957	682	0
2	Swine	Liquid	FF	Midwest	2	87	Large1	11,507	1,541	10,272	1,089	0
2	Swine	Liquid	FF	Mid-Atlantic	3	21	Large1	118,315	580	5,187	0	0
2	Swine	Liquid	FF	Midwest	3	98	Large1	116,232	580	5,097	0	0
2	Swine	Liquid	FF	Mid-Atlantic	1	86	Large2	1,303	8,018	300	8,106	0
2	Swine	Liquid	FF	Midwest	1	184	Large2	1,126	7,286	245	7,094	0
2	Swine	Liquid	FF	Mid-Atlantic	2	41	Large2	394,750	1,724	71,313	1,319	0
2	Swine	Liquid	FF	Midwest	2	88	Large2	319,864	2,566	51,436	2,160	0
2	Swine	Liquid	FF	Mid-Atlantic	3	52	Large2	554,131	580	24,192	0	0
2	Swine	Liquid	FF	Midwest	3	109	Large2	448,511	580	19,586	0	0
2	Swine	Liquid	FF	Mid-Atlantic	1	182	Medium1a	2,053	1,482	890	1,067	0
2	Swine	Liquid	FF	Midwest	1	1639	Medium1a	1,701	1,244	878	811	0
2	Swine	Liquid	FF	Mid-Atlantic	2	13	Medium1a	7,939	1,127	1,435	693	0
2	Swine	Liquid	FF	Midwest	2	116	Medium1a	7,858	1,231	993	797	731
2	Swine	Liquid	FF	Mid-Atlantic	3	20	Medium1a	33,260	580	1,588	0	0
2	Swine	Liquid	FF	Midwest	3	186	Medium1a	32,228	580	1,742	0	0
2	Swine	Liquid	FF	Mid-Atlantic	1	122	Medium1b	2,904	2,199	1,334	1,822	0
2	Swine	Liquid	FF	Midwest	1	1093	Medium1b	2,276	1,771	1,153	1,362	0
2	Swine	Liquid	FF	Mid-Atlantic	2	8	Medium1b	41,731	1,127	7,184	693	0
2	Swine	Liquid	FF	Midwest	2	77	Medium1b	9,322	1,231	9,843	797	0
2	Swine	Liquid	FF	Mid-Atlantic	3	14	Medium1b	54,889	580	2,529	0	0
2	Swine	Liquid	FF	Midwest	3	124	Medium1b	53,024	580	2,646	0	0
2	Swine	Liquid	FF	Mid-Atlantic	1	81	Medium2	3,696	2,889	1,760	2,549	0
2	Swine	Liquid	FF	Midwest	1	418	Medium2	2,862	2,336	1,447	1,952	0

Cost for Swine Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3 yr rec	5 yr rec
2	Swine	Liquid	FF	Mid-Atlantic	2	8	Medium2	56,904	1,544	10,128	1,132	0
2	Swine	Liquid	FF	Midwest	2	41	Medium2	11,086	1,726	2,931	1,315	0
2	Swine	Liquid	FF	Mid-Atlantic	3	12	Medium2	75,688	580	3,434	0	0
2	Swine	Liquid	FF	Midwest	3	62	Medium2	75,270	580	3,614	0	0
2	Swine	Liquid	GF	Mid-Atlantic	1	173	Large1	677	2,124	202	1,750	0
2	Swine	Liquid	GF	Midwest	1	214	Large1	655	2,238	193	1,818	0
2	Swine	Liquid	GF	Mid-Atlantic	2	53	Large1	86,744	1,041	16,038	582	0
2	Swine	Liquid	GF	Midwest	2	66	Large1	83,631	1,379	13,896	920	0
2	Swine	Liquid	GF	Mid-Atlantic	3	49	Large1	119,757	580	6,146	0	0
2	Swine	Liquid	GF	Midwest	3	61	Large1	115,367	580	5,920	0	0
2	Swine	Liquid	GF	Mid-Atlantic	1	92	Large2	968	4,444	241	4,252	0
2	Swine	Liquid	GF	Midwest	1	47	Large2	982	5,447	227	5,172	0
2	Swine	Liquid	GF	Mid-Atlantic	2	108	Large2	208,015	1,219	39,504	775	0
2	Swine	Liquid	GF	Midwest	2	55	Large2	233,808	1,689	39,975	1,244	0
2	Swine	Liquid	GF	Mid-Atlantic	3	56	Large2	290,778	580	14,948	0	0
2	Swine	Liquid	GF	Midwest	3	29	Large2	327,157	580	16,821	0	0
2	Swine	Liquid	GF	Mid-Atlantic	1	148	Medium1a	2,204	1,607	968	1,198	0
2	Swine	Liquid	GF	Midwest	1	859	Medium1a	1,780	1,314	914	884	0
2	Swine	Liquid	GF	Mid-Atlantic	2	18	Medium1a	28,955	1,026	5,056	586	0
2	Swine	Liquid	GF	Midwest	2	103	Medium1a	7,971	1,110	1,842	671	0
2	Swine	Liquid	GF	Mid-Atlantic	3	31	Medium1a	37,029	580	1,995	0	0
2	Swine	Liquid	GF	Midwest	3	176	Medium1a	34,999	580	2,089	0	0
2	Swine	Liquid	GF	Mid-Atlantic	1	26	Medium1b	2,907	2,202	1,336	1,825	0
2	Swine	Liquid	GF	Midwest	1	154	Medium1b	2,243	1,740	1,137	1,329	0
2	Swine	Liquid	GF	Mid-Atlantic	2	3	Medium1b	41,698	1,026	7,518	586	0
2	Swine	Liquid	GF	Midwest	2	18	Medium1b	39,438	1,110	6,639	671	0
2	Swine	Liquid	GF	Mid-Atlantic	3	5	Medium1b	54,985	580	2,916	0	0
2	Swine	Liquid	GF	Midwest	3	32	Medium1b	51,801	580	2,951	0	0
2	Swine	Liquid	GF	Mid-Atlantic	1	73	Medium2	3,719	2,909	1,772	2,570	0

Cost for Swine Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3 yr rec	5 yr rec
2	Swine	Liquid	GF	Midwest	1	188	Medium2	2,839	2,313	1,435	1,928	0
2	Swine	Liquid	GF	Mid-Atlantic	2	14	Medium2	57,112	1,319	10,619	896	0
2	Swine	Liquid	GF	Midwest	2	37	Medium2	55,744	1,459	9,597	1,035	0
2	Swine	Liquid	GF	Mid-Atlantic	3	17	Medium2	76,299	580	4,011	0	0
2	Swine	Liquid	GF	Midwest	3	44	Medium2	74,370	580	4,110	0	0
3	Swine	Liquid	FF	Mid-Atlantic	1	18	Large1	24,532	736	2,240	253	2,703
3	Swine	Liquid	FF	Midwest	1	95	Large1	27,640	742	2,524	254	2,370
3	Swine	Liquid	FF	Mid-Atlantic	2	3	Large1	28,915	668	2,130	181	156,629
3	Swine	Liquid	FF	Midwest	2	16	Large1	31,082	739	2,372	251	3,349
3	Swine	Liquid	FF	Mid-Atlantic	3	3	Large1	142,206	580	24,489	0	2,703
3	Swine	Liquid	FF	Midwest	3	18	Large1	143,237	580	24,364	0	2,370
3	Swine	Liquid	FF	Mid-Atlantic	1	27	Large1	24,565	2,105	2,260	1,729	2,703
3	Swine	Liquid	FF	Midwest	1	143	Large1	27,661	2,251	2,537	1,832	2,370
3	Swine	Liquid	FF	Mid-Atlantic	2	4	Large1	103,041	1,134	16,690	682	2,703
3	Swine	Liquid	FF	Midwest	2	24	Large1	31,094	1,541	12,248	1,089	2,370
3	Swine	Liquid	FF	Mid-Atlantic	3	5	Large1	142,206	580	7,246	0	2,703
3	Swine	Liquid	FF	Midwest	3	27	Large1	143,237	580	7,440	0	2,370
3	Swine	Liquid	FF	Mid-Atlantic	1	14	Large2	101,273	1,340	5,934	905	2,703
3	Swine	Liquid	FF	Midwest	1	34	Large2	95,118	1,228	5,770	762	2,370
3	Swine	Liquid	FF	Mid-Atlantic	2	7	Large2	464,669	808	12,853	331	2,703
3	Swine	Liquid	FF	Midwest	2	16	Large2	90,865	976	4,848	498	549,868
3	Swine	Liquid	FF	Mid-Atlantic	3	8	Large2	654,265	580	114,045	0	2,703
3	Swine	Liquid	FF	Midwest	3	20	Large2	542,589	580	93,070	0	2,370
3	Swine	Liquid	FF	Mid-Atlantic	1	21	Large2	101,437	8,018	6,035	8,106	2,703
3	Swine	Liquid	FF	Midwest	1	50	Large2	95,203	7,286	5,823	7,094	2,370
3	Swine	Liquid	FF	Mid-Atlantic	2	10	Large2	464,692	1,724	75,553	1,319	2,703
3	Swine	Liquid	FF	Midwest	2	24	Large2	385,787	2,566	55,620	2,160	2,370
3	Swine	Liquid	FF	Mid-Atlantic	3	12	Large2	654,265	580	29,927	0	2,703
3	Swine	Liquid	FF	Midwest	3	30	Large2	542,589	580	25,164	0	2,370

Cost for Swine Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3 yr rec	5 yr rec
3	Swine	Liquid	FF	Mid-Atlantic	1	29	Medium1a	9,170	672	1,680	214	2,854
3	Swine	Liquid	FF	Midwest	1	300	Medium1a	10,066	644	2,035	184	3,048
3	Swine	Liquid	FF	Mid-Atlantic	2	2	Medium1a	13,667	689	1,727	232	2,854
3	Swine	Liquid	FF	Midwest	2	21	Medium1a	14,336	709	2,094	252	3,048
3	Swine	Liquid	FF	Mid-Atlantic	3	3	Medium1a	41,187	580	7,033	0	2,854
3	Swine	Liquid	FF	Midwest	3	34	Medium1a	41,098	580	7,209	0	3,048
3	Swine	Liquid	FF	Mid-Atlantic	1	44	Medium1a	9,981	1,482	2,178	1,067	2,854
3	Swine	Liquid	FF	Midwest	1	450	Medium1a	10,572	1,244	2,345	811	3,048
3	Swine	Liquid	FF	Mid-Atlantic	2	3	Medium1a	14,106	1,127	2,636	693	2,854
3	Swine	Liquid	FF	Midwest	2	32	Medium1a	14,775	1,231	2,364	797	3,779
3	Swine	Liquid	FF	Mid-Atlantic	3	5	Medium1a	41,187	580	2,876	0	2,854
3	Swine	Liquid	FF	Midwest	3	51	Medium1a	41,098	580	3,209	0	3,048
3	Swine	Liquid	FF	Mid-Atlantic	1	19	Medium1b	13,551	745	1,930	291	2,854
3	Swine	Liquid	FF	Midwest	1	200	Medium1b	14,864	695	2,287	237	3,048
3	Swine	Liquid	FF	Mid-Atlantic	2	1	Medium1b	18,100	685	1,895	227	58,051
3	Swine	Liquid	FF	Midwest	2	14	Medium1b	19,050	709	2,278	252	3,048
3	Swine	Liquid	FF	Mid-Atlantic	3	2	Medium1b	66,992	580	11,478	0	2,854
3	Swine	Liquid	FF	Midwest	3	23	Medium1b	66,517	580	11,512	0	3,048
3	Swine	Liquid	FF	Mid-Atlantic	1	29	Medium1b	15,006	2,199	2,823	1,822	2,854
3	Swine	Liquid	FF	Midwest	1	300	Medium1b	15,770	1,771	2,844	1,362	3,048
3	Swine	Liquid	FF	Mid-Atlantic	2	2	Medium1b	50,832	1,127	8,525	693	2,854
3	Swine	Liquid	FF	Midwest	2	21	Medium1b	19,489	1,231	11,369	797	3,048
3	Swine	Liquid	FF	Mid-Atlantic	3	3	Medium1b	66,992	580	4,018	0	2,854
3	Swine	Liquid	FF	Midwest	3	34	Medium1b	66,517	580	4,337	0	3,048
3	Swine	Liquid	FF	Mid-Atlantic	1	13	Medium2	17,618	816	2,163	365	2,854
3	Swine	Liquid	FF	Midwest	1	76	Medium2	19,809	750	2,549	294	3,048
3	Swine	Liquid	FF	Mid-Atlantic	2	1	Medium2	22,108	720	2,071	264	92,560
3	Swine	Liquid	FF	Midwest	2	7	Medium2	23,782	752	2,487	297	3,048
3	Swine	Liquid	FF	Mid-Atlantic	3	2	Medium2	91,685	580	15,750	0	2,854

Cost for Swine Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3 yr rec	5 yr rec
3	Swine	Liquid	FF	Midwest	3	11	Medium2	93,553	580	16,111	0	3,048
3	Swine	Liquid	FF	Mid-Atlantic	1	19	Medium2	19,693	2,889	3,437	2,549	2,854
3	Swine	Liquid	FF	Midwest	1	115	Medium2	21,145	2,336	3,369	1,952	3,048
3	Swine	Liquid	FF	Mid-Atlantic	2	2	Medium2	68,727	1,544	11,599	1,132	2,854
3	Swine	Liquid	FF	Midwest	2	11	Medium2	24,602	1,726	4,618	1,315	3,048
3	Swine	Liquid	FF	Mid-Atlantic	3	3	Medium2	91,685	580	5,111	0	2,854
3	Swine	Liquid	FF	Midwest	3	17	Medium2	93,553	580	5,536	0	3,048
3	Swine	Liquid	GF	Mid-Atlantic	1	28	Large1	24,796	738	2,252	255	2,703
3	Swine	Liquid	GF	Midwest	1	39	Large1	27,458	740	2,515	252	2,370
3	Swine	Liquid	GF	Mid-Atlantic	2	9	Large1	29,165	648	2,140	159	209,958
3	Swine	Liquid	GF	Midwest	2	12	Large1	30,914	699	2,364	209	88,309
3	Swine	Liquid	GF	Mid-Atlantic	3	8	Large1	143,910	580	31,503	0	2,703
3	Swine	Liquid	GF	Midwest	3	11	Large1	142,191	580	30,643	0	2,370
3	Swine	Liquid	GF	Mid-Atlantic	1	41	Large1	24,830	2,124	2,273	1,750	2,703
3	Swine	Liquid	GF	Midwest	1	59	Large1	27,479	2,238	2,528	1,818	2,370
3	Swine	Liquid	GF	Mid-Atlantic	2	13	Large1	104,243	1,041	17,780	582	2,703
3	Swine	Liquid	GF	Midwest	2	18	Large1	103,093	1,379	15,866	920	2,370
3	Swine	Liquid	GF	Mid-Atlantic	3	12	Large1	143,910	580	8,217	0	2,703
3	Swine	Liquid	GF	Midwest	3	17	Large1	142,191	580	8,255	0	2,370
3	Swine	Liquid	GF	Mid-Atlantic	1	15	Large2	55,373	975	3,724	511	2,703
3	Swine	Liquid	GF	Midwest	1	9	Large2	70,800	1,050	4,600	576	2,370
3	Swine	Liquid	GF	Mid-Atlantic	2	17	Large2	57,498	760	3,288	279	501,026
3	Swine	Liquid	GF	Midwest	2	10	Large2	69,666	892	3,963	410	345,312
3	Swine	Liquid	GF	Mid-Atlantic	3	9	Large2	345,269	580	76,750	0	2,703
3	Swine	Liquid	GF	Midwest	3	5	Large2	397,037	580	86,942	0	2,370
3	Swine	Liquid	GF	Mid-Atlantic	1	22	Large2	55,459	4,444	3,776	4,252	2,703
3	Swine	Liquid	GF	Midwest	1	13	Large2	70,862	5,447	4,638	5,172	2,370
3	Swine	Liquid	GF	Mid-Atlantic	2	26	Large2	246,507	1,219	42,247	775	2,703
3	Swine	Liquid	GF	Midwest	2	15	Large2	283,053	1,689	43,365	1,244	2,370

Cost for Swine Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3 yr rec	5 yr rec
3	Swine	Liquid	GF	Mid-Atlantic	3	13	Large2	345,269	580	18,483	0	2,703
3	Swine	Liquid	GF	Midwest	3	8	Large2	397,037	580	21,232	0	2,370
3	Swine	Liquid	GF	Mid-Atlantic	1	24	Medium1a	9,951	685	1,724	227	2,854
3	Swine	Liquid	GF	Midwest	1	157	Medium1a	10,721	651	2,069	191	3,048
3	Swine	Liquid	GF	Mid-Atlantic	2	3	Medium1a	14,425	639	1,727	180	44,201
3	Swine	Liquid	GF	Midwest	2	19	Medium1a	14,947	653	2,091	194	3,048
3	Swine	Liquid	GF	Mid-Atlantic	3	5	Medium1a	45,698	580	9,628	0	2,854
3	Swine	Liquid	GF	Midwest	3	32	Medium1a	44,498	580	9,484	0	3,048
3	Swine	Liquid	GF	Mid-Atlantic	1	35	Medium1a	10,874	1,607	2,291	1,198	2,854
3	Swine	Liquid	GF	Midwest	1	236	Medium1a	11,279	1,314	2,412	884	3,048
3	Swine	Liquid	GF	Mid-Atlantic	2	4	Medium1a	35,645	1,026	6,282	586	2,854
3	Swine	Liquid	GF	Midwest	2	28	Medium1a	15,332	1,110	3,234	671	3,048
3	Swine	Liquid	GF	Mid-Atlantic	3	7	Medium1a	45,698	580	3,318	0	2,854
3	Swine	Liquid	GF	Midwest	3	48	Medium1a	44,498	580	3,587	0	3,048
3	Swine	Liquid	GF	Mid-Atlantic	1	4	Medium1b	13,570	746	1,931	292	2,854
3	Swine	Liquid	GF	Midwest	1	28	Medium1b	14,587	692	2,273	234	3,048
3	Swine	Liquid	GF	Mid-Atlantic	2	0	Medium1b	50,425	639	2,669	180	2,854
3	Swine	Liquid	GF	Midwest	2	3	Medium1b	18,735	651	2,238	191	53,292
3	Swine	Liquid	GF	Mid-Atlantic	3	1	Medium1b	67,106	580	14,372	0	2,854
3	Swine	Liquid	GF	Midwest	3	6	Medium1b	65,028	580	13,946	0	3,048
3	Swine	Liquid	GF	Mid-Atlantic	1	6	Medium1b	15,028	2,202	2,826	1,825	2,854
3	Swine	Liquid	GF	Midwest	1	42	Medium1b	15,470	1,740	2,815	1,329	3,048
3	Swine	Liquid	GF	Mid-Atlantic	2	1	Medium1b	50,812	1,026	8,859	586	2,854
3	Swine	Liquid	GF	Midwest	2	5	Medium1b	49,418	1,110	8,157	671	3,048
3	Swine	Liquid	GF	Mid-Atlantic	3	1	Medium1b	67,106	580	4,407	0	2,854
3	Swine	Liquid	GF	Midwest	3	9	Medium1b	65,028	580	4,629	0	3,048
3	Swine	Liquid	GF	Mid-Atlantic	1	12	Medium2	17,737	818	2,170	368	2,854
3	Swine	Liquid	GF	Midwest	1	34	Medium2	19,612	748	2,539	292	3,048
3	Swine	Liquid	GF	Mid-Atlantic	2	2	Medium2	22,212	709	2,069	253	103,576

Cost for Swine Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3 yr rec	5 yr rec
3	Swine	Liquid	GF	Midwest	2	7	Medium2	23,581	734	2,471	278	18,181
3	Swine	Liquid	GF	Mid-Atlantic	3	3	Medium2	92,409	580	20,003	0	2,854
3	Swine	Liquid	GF	Midwest	3	8	Medium2	92,462	580	19,940	0	3,048
3	Swine	Liquid	GF	Mid-Atlantic	1	18	Medium2	19,830	2,909	3,455	2,570	2,854
3	Swine	Liquid	GF	Midwest	1	52	Medium2	20,930	2,313	3,348	1,928	3,048
3	Swine	Liquid	GF	Mid-Atlantic	2	3	Medium2	69,013	1,319	12,094	896	2,854
3	Swine	Liquid	GF	Midwest	2	10	Medium2	69,126	1,459	11,277	1,035	3,048
3	Swine	Liquid	GF	Mid-Atlantic	3	4	Medium2	92,409	580	5,694	0	2,854
3	Swine	Liquid	GF	Midwest	3	12	Medium2	92,462	580	6,023	0	3,048
3.1	Swine	Liquid	FF	Mid-Atlantic	1	57	Large1	640	736	181	253	2,703
3.1	Swine	Liquid	FF	Midwest	1	252	Large1	635	742	180	254	2,370
3.1	Swine	Liquid	FF	Mid-Atlantic	2	9	Large1	11,597	668	397	181	156,629
3.1	Swine	Liquid	FF	Midwest	2	42	Large1	11,495	739	395	251	3,349
3.1	Swine	Liquid	FF	Mid-Atlantic	3	11	Large1	118,315	580	22,431	0	2,703
3.1	Swine	Liquid	FF	Midwest	3	47	Large1	116,232	580	22,021	0	2,370
3.1	Swine	Liquid	FF	Mid-Atlantic	1	85	Large1	674	2,105	202	1,729	2,703
3.1	Swine	Liquid	FF	Midwest	1	378	Large1	657	2,251	193	1,832	2,370
3.1	Swine	Liquid	FF	Mid-Atlantic	2	14	Large1	85,724	1,134	14,957	682	2,703
3.1	Swine	Liquid	FF	Midwest	2	63	Large1	11,507	1,541	10,272	1,089	2,370
3.1	Swine	Liquid	FF	Mid-Atlantic	3	16	Large1	118,315	580	5,187	0	2,703
3.1	Swine	Liquid	FF	Midwest	3	71	Large1	116,232	580	5,097	0	2,370
3.1	Swine	Liquid	FF	Mid-Atlantic	1	44	Large2	1,139	1,340	200	905	2,703
3.1	Swine	Liquid	FF	Midwest	1	89	Large2	1,040	1,228	192	762	2,370
3.1	Swine	Liquid	FF	Mid-Atlantic	2	21	Large2	394,727	808	8,613	331	2,703
3.1	Swine	Liquid	FF	Midwest	2	43	Large2	24,943	976	664	498	549,868
3.1	Swine	Liquid	FF	Mid-Atlantic	3	26	Large2	554,131	580	108,310	0	2,703
3.1	Swine	Liquid	FF	Midwest	3	53	Large2	448,511	580	87,492	0	2,370
3.1	Swine	Liquid	FF	Mid-Atlantic	1	66	Large2	1,303	8,018	300	8,106	2,703
3.1	Swine	Liquid	FF	Midwest	1	133	Large2	1,126	7,286	245	7,094	2,370

Cost for Swine Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3 yr rec	5 yr rec
3.1	Swine	Liquid	FF	Mid-Atlantic	2	32	Large2	394,750	1,724	71,313	1,319	2,703
3.1	Swine	Liquid	FF	Midwest	2	64	Large2	319,864	2,566	51,436	2,160	2,370
3.1	Swine	Liquid	FF	Mid-Atlantic	3	39	Large2	554,131	580	24,192	0	2,703
3.1	Swine	Liquid	FF	Midwest	3	79	Large2	448,511	580	19,586	0	2,370
3.1	Swine	Liquid	FF	Mid-Atlantic	1	93	Medium1a	1,242	672	392	214	2,854
3.1	Swine	Liquid	FF	Midwest	1	792	Medium1a	1,196	644	567	184	3,048
3.1	Swine	Liquid	FF	Mid-Atlantic	2	7	Medium1a	7,500	689	526	232	2,854
3.1	Swine	Liquid	FF	Midwest	2	56	Medium1a	7,419	709	723	252	3,048
3.1	Swine	Liquid	FF	Mid-Atlantic	3	10	Medium1a	33,260	580	5,745	0	2,854
3.1	Swine	Liquid	FF	Midwest	3	90	Medium1a	32,228	580	5,742	0	3,048
3.1	Swine	Liquid	FF	Mid-Atlantic	1	139	Medium1a	2,053	1,482	890	1,067	2,854
3.1	Swine	Liquid	FF	Midwest	1	1189	Medium1a	1,701	1,244	878	811	3,048
3.1	Swine	Liquid	FF	Mid-Atlantic	2	10	Medium1a	7,939	1,127	1,435	693	2,854
3.1	Swine	Liquid	FF	Midwest	2	84	Medium1a	7,858	1,231	993	797	3,779
3.1	Swine	Liquid	FF	Mid-Atlantic	3	16	Medium1a	33,260	580	1,588	0	2,854
3.1	Swine	Liquid	FF	Midwest	3	135	Medium1a	32,228	580	1,742	0	3,048
3.1	Swine	Liquid	FF	Mid-Atlantic	1	62	Medium1b	1,449	745	440	291	2,854
3.1	Swine	Liquid	FF	Midwest	1	528	Medium1b	1,370	695	596	237	3,048
3.1	Swine	Liquid	FF	Mid-Atlantic	2	4	Medium1b	8,999	685	554	227	58,051
3.1	Swine	Liquid	FF	Midwest	2	37	Medium1b	8,883	709	752	252	3,048
3.1	Swine	Liquid	FF	Mid-Atlantic	3	7	Medium1b	54,889	580	9,988	0	2,854
3.1	Swine	Liquid	FF	Midwest	3	60	Medium1b	53,024	580	9,820	0	3,048
3.1	Swine	Liquid	FF	Mid-Atlantic	1	93	Medium1b	2,904	2,199	1,334	1,822	2,854
3.1	Swine	Liquid	FF	Midwest	1	793	Medium1b	2,276	1,771	1,153	1,362	3,048
3.1	Swine	Liquid	FF	Mid-Atlantic	2	6	Medium1b	41,731	1,127	7,184	693	2,854
3.1	Swine	Liquid	FF	Midwest	2	56	Medium1b	9,322	1,231	9,843	797	3,048
3.1	Swine	Liquid	FF	Mid-Atlantic	3	11	Medium1b	54,889	580	2,529	0	2,854
3.1	Swine	Liquid	FF	Midwest	3	90	Medium1b	53,024	580	2,646	0	3,048
3.1	Swine	Liquid	FF	Mid-Atlantic	1	41	Medium2	1,621	816	485	365	2,854

Cost for Swine Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3 yr rec	5 yr rec
3.1	Swine	Liquid	FF	Midwest	1	202	Medium2	1,526	750	627	294	3,048
3.1	Swine	Liquid	FF	Mid-Atlantic	2	4	Medium2	10,285	720	600	264	92,560
3.1	Swine	Liquid	FF	Midwest	2	20	Medium2	10,266	752	801	297	3,048
3.1	Swine	Liquid	FF	Mid-Atlantic	3	6	Medium2	75,688	580	14,073	0	2,854
3.1	Swine	Liquid	FF	Midwest	3	30	Medium2	75,270	580	14,189	0	3,048
3.1	Swine	Liquid	FF	Mid-Atlantic	1	62	Medium2	3,696	2,889	1,760	2,549	2,854
3.1	Swine	Liquid	FF	Midwest	1	303	Medium2	2,862	2,336	1,447	1,952	3,048
3.1	Swine	Liquid	FF	Mid-Atlantic	2	6	Medium2	56,904	1,544	10,128	1,132	2,854
3.1	Swine	Liquid	FF	Midwest	2	30	Medium2	11,086	1,726	2,931	1,315	3,048
3.1	Swine	Liquid	FF	Mid-Atlantic	3	9	Medium2	75,688	580	3,434	0	2,854
3.1	Swine	Liquid	FF	Midwest	3	45	Medium2	75,270	580	3,614	0	3,048
3.1	Swine	Liquid	GF	Mid-Atlantic	1	88	Large1	643	738	181	255	2,703
3.1	Swine	Liquid	GF	Midwest	1	103	Large1	634	740	180	252	2,370
3.1	Swine	Liquid	GF	Mid-Atlantic	2	27	Large1	11,666	648	398	159	209,958
3.1	Swine	Liquid	GF	Midwest	2	32	Large1	11,452	699	394	209	88,309
3.1	Swine	Liquid	GF	Mid-Atlantic	3	25	Large1	119,757	580	29,432	0	2,703
3.1	Swine	Liquid	GF	Midwest	3	29	Large1	115,367	580	28,308	0	2,370
3.1	Swine	Liquid	GF	Mid-Atlantic	1	131	Large1	677	2,124	202	1,750	2,703
3.1	Swine	Liquid	GF	Midwest	1	155	Large1	655	2,238	193	1,818	2,370
3.1	Swine	Liquid	GF	Mid-Atlantic	2	41	Large1	86,744	1,041	16,038	582	2,703
3.1	Swine	Liquid	GF	Midwest	2	48	Large1	83,631	1,379	13,896	920	2,370
3.1	Swine	Liquid	GF	Mid-Atlantic	3	37	Large1	119,757	580	6,146	0	2,703
3.1	Swine	Liquid	GF	Midwest	3	44	Large1	115,367	580	5,920	0	2,370
3.1	Swine	Liquid	GF	Mid-Atlantic	1	47	Large2	883	975	189	511	2,703
3.1	Swine	Liquid	GF	Midwest	1	23	Large2	920	1,050	188	576	2,370
3.1	Swine	Liquid	GF	Mid-Atlantic	2	55	Large2	19,006	760	545	279	501,026
3.1	Swine	Liquid	GF	Midwest	2	27	Large2	20,421	892	573	410	345,312
3.1	Swine	Liquid	GF	Mid-Atlantic	3	29	Large2	290,778	580	73,215	0	2,703
3.1	Swine	Liquid	GF	Midwest	3	14	Large2	327,157	580	82,531	0	2,370

Cost for Swine Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3 yr rec	5 yr rec
3.1	Swine	Liquid	GF	Mid-Atlantic	1	70	Large2	968	4,444	241	4,252	2,703
3.1	Swine	Liquid	GF	Midwest	1	34	Large2	982	5,447	227	5,172	2,370
3.1	Swine	Liquid	GF	Mid-Atlantic	2	82	Large2	208,015	1,219	39,504	775	2,703
3.1	Swine	Liquid	GF	Midwest	2	40	Large2	233,808	1,689	39,975	1,244	2,370
3.1	Swine	Liquid	GF	Mid-Atlantic	3	43	Large2	290,778	580	14,948	0	2,703
3.1	Swine	Liquid	GF	Midwest	3	21	Large2	327,157	580	16,821	0	2,370
3.1	Swine	Liquid	GF	Mid-Atlantic	1	75	Medium1a	1,281	685	401	227	2,854
3.1	Swine	Liquid	GF	Midwest	1	416	Medium1a	1,222	651	571	191	3,048
3.1	Swine	Liquid	GF	Mid-Atlantic	2	9	Medium1a	7,735	639	502	180	44,201
3.1	Swine	Liquid	GF	Midwest	2	50	Medium1a	7,586	653	698	194	3,048
3.1	Swine	Liquid	GF	Mid-Atlantic	3	16	Medium1a	37,029	580	8,304	0	2,854
3.1	Swine	Liquid	GF	Midwest	3	85	Medium1a	34,999	580	7,986	0	3,048
3.1	Swine	Liquid	GF	Mid-Atlantic	1	113	Medium1a	2,204	1,607	968	1,198	2,854
3.1	Swine	Liquid	GF	Midwest	1	623	Medium1a	1,780	1,314	914	884	3,048
3.1	Swine	Liquid	GF	Mid-Atlantic	2	14	Medium1a	28,955	1,026	5,056	586	2,854
3.1	Swine	Liquid	GF	Midwest	2	74	Medium1a	7,971	1,110	1,842	671	3,048
3.1	Swine	Liquid	GF	Mid-Atlantic	3	23	Medium1a	37,029	580	1,995	0	2,854
3.1	Swine	Liquid	GF	Midwest	3	128	Medium1a	34,999	580	2,089	0	3,048
3.1	Swine	Liquid	GF	Mid-Atlantic	1	13	Medium1b	1,449	746	440	292	2,854
3.1	Swine	Liquid	GF	Midwest	1	74	Medium1b	1,360	692	595	234	3,048
3.1	Swine	Liquid	GF	Mid-Atlantic	2	2	Medium1b	41,311	639	1,327	180	2,854
3.1	Swine	Liquid	GF	Midwest	2	9	Medium1b	8,755	651	720	191	53,292
3.1	Swine	Liquid	GF	Mid-Atlantic	3	3	Medium1b	54,985	580	12,882	0	2,854
3.1	Swine	Liquid	GF	Midwest	3	15	Medium1b	51,801	580	12,268	0	3,048
3.1	Swine	Liquid	GF	Mid-Atlantic	1	20	Medium1b	2,907	2,202	1,336	1,825	2,854
3.1	Swine	Liquid	GF	Midwest	1	111	Medium1b	2,243	1,740	1,137	1,329	3,048
3.1	Swine	Liquid	GF	Mid-Atlantic	2	2	Medium1b	41,698	1,026	7,518	586	2,854
3.1	Swine	Liquid	GF	Midwest	2	13	Medium1b	39,438	1,110	6,639	671	3,048
3.1	Swine	Liquid	GF	Mid-Atlantic	3	4	Medium1b	54,985	580	2,916	0	2,854

Cost for Swine Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3 yr rec	5 yr rec
3.1	Swine	Liquid	GF	Midwest	3	23	Medium1b	51,801	580	2,951	0	3,048
3.1	Swine	Liquid	GF	Mid-Atlantic	1	37	Medium2	1,626	818	487	368	2,854
3.1	Swine	Liquid	GF	Midwest	1	91	Medium2	1,520	748	625	292	3,048
3.1	Swine	Liquid	GF	Mid-Atlantic	2	7	Medium2	10,311	709	594	253	103,576
3.1	Swine	Liquid	GF	Midwest	2	18	Medium2	10,199	734	790	278	18,181
3.1	Swine	Liquid	GF	Mid-Atlantic	3	9	Medium2	76,299	580	18,320	0	2,854
3.1	Swine	Liquid	GF	Midwest	3	21	Medium2	74,370	580	18,027	0	3,048
3.1	Swine	Liquid	GF	Mid-Atlantic	1	56	Medium2	3,719	2,909	1,772	2,570	2,854
3.1	Swine	Liquid	GF	Midwest	1	137	Medium2	2,839	2,313	1,435	1,928	3,048
3.1	Swine	Liquid	GF	Mid-Atlantic	2	11	Medium2	57,112	1,319	10,619	896	2,854
3.1	Swine	Liquid	GF	Midwest	2	27	Medium2	55,744	1,459	9,597	1,035	3,048
3.1	Swine	Liquid	GF	Mid-Atlantic	3	13	Medium2	76,299	580	4,011	0	2,854
3.1	Swine	Liquid	GF	Midwest	3	32	Medium2	74,370	580	4,110	0	3,048
4	Swine	Liquid	FF	Mid-Atlantic	1	18	Large1	24,532	1,128	7,373	253	2,703
4	Swine	Liquid	FF	Midwest	1	95	Large1	27,640	1,134	7,031	254	2,370
4	Swine	Liquid	FF	Mid-Atlantic	2	3	Large1	28,915	1,060	7,263	181	156,629
4	Swine	Liquid	FF	Midwest	2	16	Large1	31,082	1,131	6,879	251	3,349
4	Swine	Liquid	FF	Mid-Atlantic	3	3	Large1	142,206	972	29,622	0	2,703
4	Swine	Liquid	FF	Midwest	3	18	Large1	143,237	972	28,872	0	2,370
4	Swine	Liquid	FF	Mid-Atlantic	1	27	Large1	24,565	2,497	7,393	1,729	2,703
4	Swine	Liquid	FF	Midwest	1	143	Large1	27,661	2,643	7,045	1,832	2,370
4	Swine	Liquid	FF	Mid-Atlantic	2	4	Large1	103,041	1,526	21,823	682	2,703
4	Swine	Liquid	FF	Midwest	2	24	Large1	31,094	1,933	16,756	1,089	2,370
4	Swine	Liquid	FF	Mid-Atlantic	3	5	Large1	142,206	972	12,379	0	2,703
4	Swine	Liquid	FF	Midwest	3	27	Large1	143,237	972	11,948	0	2,370
4	Swine	Liquid	FF	Mid-Atlantic	1	14	Large2	101,273	1,732	11,067	905	2,703
4	Swine	Liquid	FF	Midwest	1	34	Large2	95,118	1,620	10,278	762	2,370
4	Swine	Liquid	FF	Mid-Atlantic	2	7	Large2	464,669	1,200	17,986	331	2,703
4	Swine	Liquid	FF	Midwest	2	16	Large2	90,865	1,368	9,355	498	549,868

Cost for Swine Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3 yr rec	5 yr rec
4	Swine	Liquid	FF	Mid-Atlantic	3	8	Large2	654,265	972	119,178	0	2,703
4	Swine	Liquid	FF	Midwest	3	20	Large2	542,589	972	97,578	0	2,370
4	Swine	Liquid	FF	Mid-Atlantic	1	21	Large2	101,437	8,410	11,168	8,106	2,703
4	Swine	Liquid	FF	Midwest	1	50	Large2	95,203	7,678	10,331	7,094	2,370
4	Swine	Liquid	FF	Mid-Atlantic	2	10	Large2	464,692	2,116	80,686	1,319	2,703
4	Swine	Liquid	FF	Midwest	2	24	Large2	385,787	2,958	60,127	2,160	2,370
4	Swine	Liquid	FF	Mid-Atlantic	3	12	Large2	654,265	972	35,060	0	2,703
4	Swine	Liquid	FF	Midwest	3	30	Large2	542,589	972	29,672	0	2,370
4	Swine	Liquid	FF	Mid-Atlantic	1	29	Medium1a	9,170	1,064	7,576	214	2,854
4	Swine	Liquid	FF	Midwest	1	300	Medium1a	10,066	1,036	5,373	184	3,048
4	Swine	Liquid	FF	Mid-Atlantic	2	2	Medium1a	13,667	1,081	7,622	232	2,854
4	Swine	Liquid	FF	Midwest	2	21	Medium1a	14,336	1,101	5,433	252	3,048
4	Swine	Liquid	FF	Mid-Atlantic	3	3	Medium1a	41,187	972	12,929	0	2,854
4	Swine	Liquid	FF	Midwest	3	34	Medium1a	41,098	972	10,548	0	3,048
4	Swine	Liquid	FF	Mid-Atlantic	1	44	Medium1a	9,981	1,874	8,074	1,067	2,854
4	Swine	Liquid	FF	Midwest	1	450	Medium1a	10,572	1,636	5,684	811	3,048
4	Swine	Liquid	FF	Mid-Atlantic	2	3	Medium1a	14,106	1,519	8,532	693	2,854
4	Swine	Liquid	FF	Midwest	2	32	Medium1a	14,775	1,623	5,702	797	3,779
4	Swine	Liquid	FF	Mid-Atlantic	3	5	Medium1a	41,187	972	8,771	0	2,854
4	Swine	Liquid	FF	Midwest	3	51	Medium1a	41,098	972	6,548	0	3,048
4	Swine	Liquid	FF	Mid-Atlantic	1	19	Medium1b	13,551	1,137	7,825	291	2,854
4	Swine	Liquid	FF	Midwest	1	200	Medium1b	14,864	1,087	5,626	237	3,048
4	Swine	Liquid	FF	Mid-Atlantic	2	1	Medium1b	18,100	1,077	7,790	227	58,051
4	Swine	Liquid	FF	Midwest	2	14	Medium1b	19,050	1,101	5,617	252	3,048
4	Swine	Liquid	FF	Mid-Atlantic	3	2	Medium1b	66,992	972	17,373	0	2,854
4	Swine	Liquid	FF	Midwest	3	23	Medium1b	66,517	972	14,850	0	3,048
4	Swine	Liquid	FF	Mid-Atlantic	1	29	Medium1b	15,006	2,591	8,719	1,822	2,854
4	Swine	Liquid	FF	Midwest	1	300	Medium1b	15,770	2,163	6,182	1,362	3,048
4	Swine	Liquid	FF	Mid-Atlantic	2	2	Medium1b	50,832	1,519	14,421	693	2,854

Cost for Swine Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3 yr rec	5 yr rec
4	Swine	Liquid	FF	Midwest	2	21	Medium1b	19,489	1,623	14,708	797	3,048
4	Swine	Liquid	FF	Mid-Atlantic	3	3	Medium1b	66,992	972	9,914	0	2,854
4	Swine	Liquid	FF	Midwest	3	34	Medium1b	66,517	972	7,676	0	3,048
4	Swine	Liquid	FF	Mid-Atlantic	1	13	Medium2	17,618	1,208	8,059	365	2,854
4	Swine	Liquid	FF	Midwest	1	76	Medium2	19,809	1,142	5,888	294	3,048
4	Swine	Liquid	FF	Mid-Atlantic	2	1	Medium2	22,108	1,112	7,967	264	92,560
4	Swine	Liquid	FF	Midwest	2	7	Medium2	23,782	1,144	5,826	297	3,048
4	Swine	Liquid	FF	Mid-Atlantic	3	2	Medium2	91,685	972	21,646	0	2,854
4	Swine	Liquid	FF	Midwest	3	11	Medium2	93,553	972	19,450	0	3,048
4	Swine	Liquid	FF	Mid-Atlantic	1	19	Medium2	19,693	3,281	9,333	2,549	2,854
4	Swine	Liquid	FF	Midwest	1	115	Medium2	21,145	2,728	6,708	1,952	3,048
4	Swine	Liquid	FF	Mid-Atlantic	2	2	Medium2	68,727	1,936	17,495	1,132	2,854
4	Swine	Liquid	FF	Midwest	2	11	Medium2	24,602	2,118	7,956	1,315	3,048
4	Swine	Liquid	FF	Mid-Atlantic	3	3	Medium2	91,685	972	11,007	0	2,854
4	Swine	Liquid	FF	Midwest	3	17	Medium2	93,553	972	8,875	0	3,048
4	Swine	Liquid	GF	Mid-Atlantic	1	28	Large1	24,796	1,130	7,385	255	2,703
4	Swine	Liquid	GF	Midwest	1	39	Large1	27,458	1,132	7,023	252	2,370
4	Swine	Liquid	GF	Mid-Atlantic	2	9	Large1	29,165	1,040	7,273	159	209,958
4	Swine	Liquid	GF	Midwest	2	12	Large1	30,914	1,091	6,872	209	88,309
4	Swine	Liquid	GF	Mid-Atlantic	3	8	Large1	143,910	972	36,636	0	2,703
4	Swine	Liquid	GF	Midwest	3	11	Large1	142,191	972	35,151	0	2,370
4	Swine	Liquid	GF	Mid-Atlantic	1	41	Large1	24,830	2,516	7,406	1,750	2,703
4	Swine	Liquid	GF	Midwest	1	59	Large1	27,479	2,630	7,036	1,818	2,370
4	Swine	Liquid	GF	Mid-Atlantic	2	13	Large1	104,243	1,433	22,912	582	2,703
4	Swine	Liquid	GF	Midwest	2	18	Large1	103,093	1,771	20,374	920	2,370
4	Swine	Liquid	GF	Mid-Atlantic	3	12	Large1	143,910	972	13,350	0	2,703
4	Swine	Liquid	GF	Midwest	3	17	Large1	142,191	972	12,763	0	2,370
4	Swine	Liquid	GF	Mid-Atlantic	1	15	Large2	55,373	1,367	8,857	511	2,703
4	Swine	Liquid	GF	Midwest	1	9	Large2	70,800	1,442	9,108	576	2,370

Cost for Swine Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3 yr rec	5 yr rec
4	Swine	Liquid	GF	Mid-Atlantic	2	17	Large2	57,498	1,152	8,421	279	501,026
4	Swine	Liquid	GF	Midwest	2	10	Large2	69,666	1,284	8,471	410	345,312
4	Swine	Liquid	GF	Mid-Atlantic	3	9	Large2	345,269	972	81,882	0	2,703
4	Swine	Liquid	GF	Midwest	3	5	Large2	397,037	972	91,450	0	2,370
4	Swine	Liquid	GF	Mid-Atlantic	1	22	Large2	55,459	4,836	8,909	4,252	2,703
4	Swine	Liquid	GF	Midwest	1	13	Large2	70,862	5,839	9,146	5,172	2,370
4	Swine	Liquid	GF	Mid-Atlantic	2	26	Large2	246,507	1,611	47,380	775	2,703
4	Swine	Liquid	GF	Midwest	2	15	Large2	283,053	2,081	47,873	1,244	2,370
4	Swine	Liquid	GF	Mid-Atlantic	3	13	Large2	345,269	972	23,615	0	2,703
4	Swine	Liquid	GF	Midwest	3	8	Large2	397,037	972	25,740	0	2,370
4	Swine	Liquid	GF	Mid-Atlantic	1	24	Medium1a	9,951	1,077	7,620	227	2,854
4	Swine	Liquid	GF	Midwest	1	157	Medium1a	10,721	1,043	5,408	191	3,048
4	Swine	Liquid	GF	Mid-Atlantic	2	3	Medium1a	14,425	1,031	7,623	180	44,201
4	Swine	Liquid	GF	Midwest	2	19	Medium1a	14,947	1,045	5,429	194	3,048
4	Swine	Liquid	GF	Mid-Atlantic	3	5	Medium1a	45,698	972	15,523	0	2,854
4	Swine	Liquid	GF	Midwest	3	32	Medium1a	44,498	972	12,822	0	3,048
4	Swine	Liquid	GF	Mid-Atlantic	1	35	Medium1a	10,874	1,999	8,187	1,198	2,854
4	Swine	Liquid	GF	Midwest	1	236	Medium1a	11,279	1,706	5,751	884	3,048
4	Swine	Liquid	GF	Mid-Atlantic	2	4	Medium1a	35,645	1,418	12,178	586	2,854
4	Swine	Liquid	GF	Midwest	2	28	Medium1a	15,332	1,502	6,572	671	3,048
4	Swine	Liquid	GF	Mid-Atlantic	3	7	Medium1a	45,698	972	9,214	0	2,854
4	Swine	Liquid	GF	Midwest	3	48	Medium1a	44,498	972	6,925	0	3,048
4	Swine	Liquid	GF	Mid-Atlantic	1	4	Medium1b	13,570	1,138	7,826	292	2,854
4	Swine	Liquid	GF	Midwest	1	28	Medium1b	14,587	1,084	5,611	234	3,048
4	Swine	Liquid	GF	Mid-Atlantic	2	0	Medium1b	50,425	1,031	8,564	180	2,854
4	Swine	Liquid	GF	Midwest	2	3	Medium1b	18,735	1,043	5,576	191	53,292
4	Swine	Liquid	GF	Mid-Atlantic	3	1	Medium1b	67,106	972	20,268	0	2,854
4	Swine	Liquid	GF	Midwest	3	6	Medium1b	65,028	972	17,285	0	3,048
4	Swine	Liquid	GF	Mid-Atlantic	1	6	Medium1b	15,028	2,594	8,722	1,825	2,854

Cost for Swine Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3 yr rec	5 yr rec
4	Swine	Liquid	GF	Midwest	1	42	Medium1b	15,470	2,132	6,153	1,329	3,048
4	Swine	Liquid	GF	Mid-Atlantic	2	1	Medium1b	50,812	1,418	14,755	586	2,854
4	Swine	Liquid	GF	Midwest	2	5	Medium1b	49,418	1,502	11,495	671	3,048
4	Swine	Liquid	GF	Mid-Atlantic	3	1	Medium1b	67,106	972	10,302	0	2,854
4	Swine	Liquid	GF	Midwest	3	9	Medium1b	65,028	972	7,968	0	3,048
4	Swine	Liquid	GF	Mid-Atlantic	1	12	Medium2	17,737	1,210	8,066	368	2,854
4	Swine	Liquid	GF	Midwest	1	34	Medium2	19,612	1,140	5,877	292	3,048
4	Swine	Liquid	GF	Mid-Atlantic	2	2	Medium2	22,212	1,101	7,965	253	103,576
4	Swine	Liquid	GF	Midwest	2	7	Medium2	23,581	1,126	5,809	278	18,181
4	Swine	Liquid	GF	Mid-Atlantic	3	3	Medium2	92,409	972	25,899	0	2,854
4	Swine	Liquid	GF	Midwest	3	8	Medium2	92,462	972	23,278	0	3,048
4	Swine	Liquid	GF	Mid-Atlantic	1	18	Medium2	19,830	3,301	9,351	2,570	2,854
4	Swine	Liquid	GF	Midwest	1	52	Medium2	20,930	2,705	6,687	1,928	3,048
4	Swine	Liquid	GF	Mid-Atlantic	2	3	Medium2	69,013	1,711	17,990	896	2,854
4	Swine	Liquid	GF	Midwest	2	10	Medium2	69,126	1,851	14,615	1,035	3,048
4	Swine	Liquid	GF	Mid-Atlantic	3	4	Medium2	92,409	972	11,589	0	2,854
4	Swine	Liquid	GF	Midwest	3	12	Medium2	92,462	972	9,362	0	3,048
4.1	Swine	Liquid	FF	Mid-Atlantic	1	57	Large1	640	1,128	5,314	253	2,703
4.1	Swine	Liquid	FF	Midwest	1	252	Large1	635	1,134	4,688	254	2,370
4.1	Swine	Liquid	FF	Mid-Atlantic	2	9	Large1	11,597	1,060	5,530	181	156,629
4.1	Swine	Liquid	FF	Midwest	2	42	Large1	11,495	1,131	4,903	251	3,349
4.1	Swine	Liquid	FF	Mid-Atlantic	3	11	Large1	118,315	972	27,563	0	2,703
4.1	Swine	Liquid	FF	Midwest	3	47	Large1	116,232	972	26,528	0	2,370
4.1	Swine	Liquid	FF	Mid-Atlantic	1	85	Large1	674	2,497	5,334	1,729	2,703
4.1	Swine	Liquid	FF	Midwest	1	378	Large1	657	2,643	4,701	1,832	2,370
4.1	Swine	Liquid	FF	Mid-Atlantic	2	14	Large1	85,724	1,526	20,090	682	2,703
4.1	Swine	Liquid	FF	Midwest	2	63	Large1	11,507	1,933	14,779	1,089	2,370
4.1	Swine	Liquid	FF	Mid-Atlantic	3	16	Large1	118,315	972	10,320	0	2,703
4.1	Swine	Liquid	FF	Midwest	3	71	Large1	116,232	972	9,605	0	2,370

Cost for Swine Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3 yr rec	5 yr rec
4.1	Swine	Liquid	FF	Mid-Atlantic	1	44	Large2	1,139	1,732	5,332	905	2,703
4.1	Swine	Liquid	FF	Midwest	1	89	Large2	1,040	1,620	4,700	762	2,370
4.1	Swine	Liquid	FF	Mid-Atlantic	2	21	Large2	394,727	1,200	13,746	331	2,703
4.1	Swine	Liquid	FF	Midwest	2	43	Large2	24,943	1,368	5,171	498	549,868
4.1	Swine	Liquid	FF	Mid-Atlantic	3	26	Large2	554,131	972	113,443	0	2,703
4.1	Swine	Liquid	FF	Midwest	3	53	Large2	448,511	972	92,000	0	2,370
4.1	Swine	Liquid	FF	Mid-Atlantic	1	66	Large2	1,303	8,410	5,433	8,106	2,703
4.1	Swine	Liquid	FF	Midwest	1	133	Large2	1,126	7,678	4,753	7,094	2,370
4.1	Swine	Liquid	FF	Mid-Atlantic	2	32	Large2	394,750	2,116	76,446	1,319	2,703
4.1	Swine	Liquid	FF	Midwest	2	64	Large2	319,864	2,958	55,943	2,160	2,370
4.1	Swine	Liquid	FF	Mid-Atlantic	3	39	Large2	554,131	972	29,325	0	2,703
4.1	Swine	Liquid	FF	Midwest	3	79	Large2	448,511	972	24,094	0	2,370
4.1	Swine	Liquid	FF	Mid-Atlantic	1	93	Medium1a	1,242	1,064	6,288	214	2,854
4.1	Swine	Liquid	FF	Midwest	1	792	Medium1a	1,196	1,036	3,906	184	3,048
4.1	Swine	Liquid	FF	Mid-Atlantic	2	7	Medium1a	7,500	1,081	6,422	232	2,854
4.1	Swine	Liquid	FF	Midwest	2	56	Medium1a	7,419	1,101	4,062	252	3,048
4.1	Swine	Liquid	FF	Mid-Atlantic	3	10	Medium1a	33,260	972	11,641	0	2,854
4.1	Swine	Liquid	FF	Midwest	3	90	Medium1a	32,228	972	9,080	0	3,048
4.1	Swine	Liquid	FF	Mid-Atlantic	1	139	Medium1a	2,053	1,874	6,786	1,067	2,854
4.1	Swine	Liquid	FF	Midwest	1	1189	Medium1a	1,701	1,636	4,216	811	3,048
4.1	Swine	Liquid	FF	Mid-Atlantic	2	10	Medium1a	7,939	1,519	7,331	693	2,854
4.1	Swine	Liquid	FF	Midwest	2	84	Medium1a	7,858	1,623	4,331	797	3,779
4.1	Swine	Liquid	FF	Mid-Atlantic	3	16	Medium1a	33,260	972	7,484	0	2,854
4.1	Swine	Liquid	FF	Midwest	3	135	Medium1a	32,228	972	5,080	0	3,048
4.1	Swine	Liquid	FF	Mid-Atlantic	1	62	Medium1b	1,449	1,137	6,336	291	2,854
4.1	Swine	Liquid	FF	Midwest	1	528	Medium1b	1,370	1,087	3,935	237	3,048
4.1	Swine	Liquid	FF	Mid-Atlantic	2	4	Medium1b	8,999	1,077	6,449	227	58,051
4.1	Swine	Liquid	FF	Midwest	2	37	Medium1b	8,883	1,101	4,091	252	3,048
4.1	Swine	Liquid	FF	Mid-Atlantic	3	7	Medium1b	54,889	972	15,884	0	2,854

Cost for Swine Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3 yr rec	5 yr rec
4.1	Swine	Liquid	FF	Midwest	3	60	Medium1b	53,024	972	13,159	0	3,048
4.1	Swine	Liquid	FF	Mid-Atlantic	1	93	Medium1b	2,904	2,591	7,229	1,822	2,854
4.1	Swine	Liquid	FF	Midwest	1	793	Medium1b	2,276	2,163	4,491	1,362	3,048
4.1	Swine	Liquid	FF	Mid-Atlantic	2	6	Medium1b	41,731	1,519	13,080	693	2,854
4.1	Swine	Liquid	FF	Midwest	2	56	Medium1b	9,322	1,623	13,182	797	3,048
4.1	Swine	Liquid	FF	Mid-Atlantic	3	11	Medium1b	54,889	972	8,424	0	2,854
4.1	Swine	Liquid	FF	Midwest	3	90	Medium1b	53,024	972	5,985	0	3,048
4.1	Swine	Liquid	FF	Mid-Atlantic	1	41	Medium2	1,621	1,208	6,381	365	2,854
4.1	Swine	Liquid	FF	Midwest	1	202	Medium2	1,526	1,142	3,965	294	3,048
4.1	Swine	Liquid	FF	Mid-Atlantic	2	4	Medium2	10,285	1,112	6,496	264	92,560
4.1	Swine	Liquid	FF	Midwest	2	20	Medium2	10,266	1,144	4,140	297	3,048
4.1	Swine	Liquid	FF	Mid-Atlantic	3	6	Medium2	75,688	972	19,968	0	2,854
4.1	Swine	Liquid	FF	Midwest	3	30	Medium2	75,270	972	17,528	0	3,048
4.1	Swine	Liquid	FF	Mid-Atlantic	1	62	Medium2	3,696	3,281	7,655	2,549	2,854
4.1	Swine	Liquid	FF	Midwest	1	303	Medium2	2,862	2,728	4,785	1,952	3,048
4.1	Swine	Liquid	FF	Mid-Atlantic	2	6	Medium2	56,904	1,936	16,024	1,132	2,854
4.1	Swine	Liquid	FF	Midwest	2	30	Medium2	11,086	2,118	6,270	1,315	3,048
4.1	Swine	Liquid	FF	Mid-Atlantic	3	9	Medium2	75,688	972	9,329	0	2,854
4.1	Swine	Liquid	FF	Midwest	3	45	Medium2	75,270	972	6,953	0	3,048
4.1	Swine	Liquid	GF	Mid-Atlantic	1	88	Large1	643	1,130	5,314	255	2,703
4.1	Swine	Liquid	GF	Midwest	1	103	Large1	634	1,132	4,688	252	2,370
4.1	Swine	Liquid	GF	Mid-Atlantic	2	27	Large1	11,666	1,040	5,531	159	209,958
4.1	Swine	Liquid	GF	Midwest	2	32	Large1	11,452	1,091	4,902	209	88,309
4.1	Swine	Liquid	GF	Mid-Atlantic	3	25	Large1	119,757	972	34,564	0	2,703
4.1	Swine	Liquid	GF	Midwest	3	29	Large1	115,367	972	32,816	0	2,370
4.1	Swine	Liquid	GF	Mid-Atlantic	1	131	Large1	677	2,516	5,335	1,750	2,703
4.1	Swine	Liquid	GF	Midwest	1	155	Large1	655	2,630	4,701	1,818	2,370
4.1	Swine	Liquid	GF	Mid-Atlantic	2	41	Large1	86,744	1,433	21,170	582	2,703
4.1	Swine	Liquid	GF	Midwest	2	48	Large1	83,631	1,771	18,404	920	2,370

Cost for Swine Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3 yr rec	5 yr rec
4.1	Swine	Liquid	GF	Mid-Atlantic	3	37	Large1	119,757	972	11,279	0	2,703
4.1	Swine	Liquid	GF	Midwest	3	44	Large1	115,367	972	10,428	0	2,370
4.1	Swine	Liquid	GF	Mid-Atlantic	1	47	Large2	883	1,367	5,322	511	2,703
4.1	Swine	Liquid	GF	Midwest	1	23	Large2	920	1,442	4,696	576	2,370
4.1	Swine	Liquid	GF	Mid-Atlantic	2	55	Large2	19,006	1,152	5,678	279	501,026
4.1	Swine	Liquid	GF	Midwest	2	27	Large2	20,421	1,284	5,081	410	345,312
4.1	Swine	Liquid	GF	Mid-Atlantic	3	29	Large2	290,778	972	78,348	0	2,703
4.1	Swine	Liquid	GF	Midwest	3	14	Large2	327,157	972	87,039	0	2,370
4.1	Swine	Liquid	GF	Mid-Atlantic	1	70	Large2	968	4,836	5,374	4,252	2,703
4.1	Swine	Liquid	GF	Midwest	1	34	Large2	982	5,839	4,734	5,172	2,370
4.1	Swine	Liquid	GF	Mid-Atlantic	2	82	Large2	208,015	1,611	44,637	775	2,703
4.1	Swine	Liquid	GF	Midwest	2	40	Large2	233,808	2,081	44,483	1,244	2,370
4.1	Swine	Liquid	GF	Mid-Atlantic	3	43	Large2	290,778	972	20,081	0	2,703
4.1	Swine	Liquid	GF	Midwest	3	21	Large2	327,157	972	21,329	0	2,370
4.1	Swine	Liquid	GF	Mid-Atlantic	1	75	Medium1a	1,281	1,077	6,296	227	2,854
4.1	Swine	Liquid	GF	Midwest	1	416	Medium1a	1,222	1,043	3,910	191	3,048
4.1	Swine	Liquid	GF	Mid-Atlantic	2	9	Medium1a	7,735	1,031	6,397	180	44,201
4.1	Swine	Liquid	GF	Midwest	2	50	Medium1a	7,586	1,045	4,037	194	3,048
4.1	Swine	Liquid	GF	Mid-Atlantic	3	16	Medium1a	37,029	972	14,200	0	2,854
4.1	Swine	Liquid	GF	Midwest	3	85	Medium1a	34,999	972	11,324	0	3,048
4.1	Swine	Liquid	GF	Mid-Atlantic	1	113	Medium1a	2,204	1,999	6,863	1,198	2,854
4.1	Swine	Liquid	GF	Midwest	1	623	Medium1a	1,780	1,706	4,253	884	3,048
4.1	Swine	Liquid	GF	Mid-Atlantic	2	14	Medium1a	28,955	1,418	10,952	586	2,854
4.1	Swine	Liquid	GF	Midwest	2	74	Medium1a	7,971	1,502	5,180	671	3,048
4.1	Swine	Liquid	GF	Mid-Atlantic	3	23	Medium1a	37,029	972	7,890	0	2,854
4.1	Swine	Liquid	GF	Midwest	3	128	Medium1a	34,999	972	5,428	0	3,048
4.1	Swine	Liquid	GF	Mid-Atlantic	1	13	Medium1b	1,449	1,138	6,336	292	2,854
4.1	Swine	Liquid	GF	Midwest	1	74	Medium1b	1,360	1,084	3,933	234	3,048
4.1	Swine	Liquid	GF	Mid-Atlantic	2	2	Medium1b	41,311	1,031	7,223	180	2,854

Cost for Swine Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3 yr rec	5 yr rec
4.1	Swine	Liquid	GF	Midwest	2	9	Medium1b	8,755	1,043	4,059	191	53,292
4.1	Swine	Liquid	GF	Mid-Atlantic	3	3	Medium1b	54,985	972	18,777	0	2,854
4.1	Swine	Liquid	GF	Midwest	3	15	Medium1b	51,801	972	15,607	0	3,048
4.1	Swine	Liquid	GF	Mid-Atlantic	1	20	Medium1b	2,907	2,594	7,231	1,825	2,854
4.1	Swine	Liquid	GF	Midwest	1	111	Medium1b	2,243	2,132	4,475	1,329	3,048
4.1	Swine	Liquid	GF	Mid-Atlantic	2	2	Medium1b	41,698	1,418	13,413	586	2,854
4.1	Swine	Liquid	GF	Midwest	2	13	Medium1b	39,438	1,502	9,978	671	3,048
4.1	Swine	Liquid	GF	Mid-Atlantic	3	4	Medium1b	54,985	972	8,812	0	2,854
4.1	Swine	Liquid	GF	Midwest	3	23	Medium1b	51,801	972	6,290	0	3,048
4.1	Swine	Liquid	GF	Mid-Atlantic	1	37	Medium2	1,626	1,210	6,382	368	2,854
4.1	Swine	Liquid	GF	Midwest	1	91	Medium2	1,520	1,140	3,964	292	3,048
4.1	Swine	Liquid	GF	Mid-Atlantic	2	7	Medium2	10,311	1,101	6,490	253	103,576
4.1	Swine	Liquid	GF	Midwest	2	18	Medium2	10,199	1,126	4,129	278	18,181
4.1	Swine	Liquid	GF	Mid-Atlantic	3	9	Medium2	76,299	972	24,216	0	2,854
4.1	Swine	Liquid	GF	Midwest	3	21	Medium2	74,370	972	21,365	0	3,048
4.1	Swine	Liquid	GF	Mid-Atlantic	1	56	Medium2	3,719	3,301	7,668	2,570	2,854
4.1	Swine	Liquid	GF	Midwest	1	137	Medium2	2,839	2,705	4,774	1,928	3,048
4.1	Swine	Liquid	GF	Mid-Atlantic	2	11	Medium2	57,112	1,711	16,515	896	2,854
4.1	Swine	Liquid	GF	Midwest	2	27	Medium2	55,744	1,851	12,935	1,035	3,048
4.1	Swine	Liquid	GF	Mid-Atlantic	3	13	Medium2	76,299	972	9,906	0	2,854
4.1	Swine	Liquid	GF	Midwest	3	32	Medium2	74,370	972	7,449	0	3,048
5	Swine	Liquid	FF	Mid-Atlantic	1	75	Large1	118,461	736	2,537	253	0
5	Swine	Liquid	FF	Midwest	1	347	Large1	116,376	742	2,495	254	0
5	Swine	Liquid	FF	Mid-Atlantic	2	12	Large1	85,713	668	29,998	181	0
5	Swine	Liquid	FF	Midwest	2	58	Large1	84,236	739	21,380	251	0
5	Swine	Liquid	FF	Mid-Atlantic	3	14	Large1	118,315	580	22,431	0	0
5	Swine	Liquid	FF	Midwest	3	65	Large1	116,232	580	22,021	0	0
5	Swine	Liquid	FF	Mid-Atlantic	1	112	Large1	118,494	2,105	2,558	1,729	0
5	Swine	Liquid	FF	Midwest	1	521	Large1	116,398	2,251	2,508	1,832	0

Cost for Swine Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3 yr rec	5 yr rec
5	Swine	Liquid	FF	Mid-Atlantic	2	19	Large1	85,724	1,134	14,738	682	0
5	Swine	Liquid	FF	Midwest	2	87	Large1	84,247	1,541	9,166	1,089	0
5	Swine	Liquid	FF	Mid-Atlantic	3	21	Large1	118,315	580	5,187	0	0
5	Swine	Liquid	FF	Midwest	3	98	Large1	116,232	580	5,097	0	0
5	Swine	Liquid	FF	Mid-Atlantic	1	58	Large2	554,292	1,340	11,263	905	0
5	Swine	Liquid	FF	Midwest	1	122	Large2	448,663	1,228	9,145	762	0
5	Swine	Liquid	FF	Mid-Atlantic	2	28	Large2	394,727	808	8,064	331	0
5	Swine	Liquid	FF	Midwest	2	59	Large2	319,841	976	117,607	498	0
5	Swine	Liquid	FF	Mid-Atlantic	3	34	Large2	554,131	580	108,310	0	0
5	Swine	Liquid	FF	Midwest	3	73	Large2	448,511	580	87,492	0	0
5	Swine	Liquid	FF	Mid-Atlantic	1	86	Large2	554,456	8,018	11,363	8,106	0
5	Swine	Liquid	FF	Midwest	1	184	Large2	448,748	7,286	9,197	7,094	0
5	Swine	Liquid	FF	Mid-Atlantic	2	41	Large2	394,750	1,724	70,764	1,319	0
5	Swine	Liquid	FF	Midwest	2	88	Large2	319,864	2,566	50,959	2,160	0
5	Swine	Liquid	FF	Mid-Atlantic	3	52	Large2	554,131	580	24,192	0	0
5	Swine	Liquid	FF	Midwest	3	109	Large2	448,511	580	19,586	0	0
5	Swine	Liquid	FF	Mid-Atlantic	1	122	Medium1a	33,877	672	1,045	214	0
5	Swine	Liquid	FF	Midwest	1	1092	Medium1a	32,807	644	1,200	184	0
5	Swine	Liquid	FF	Mid-Atlantic	2	9	Medium1a	25,944	689	896	232	0
5	Swine	Liquid	FF	Midwest	2	78	Medium1a	25,212	709	1,080	252	0
5	Swine	Liquid	FF	Mid-Atlantic	3	14	Medium1a	33,260	580	5,745	0	0
5	Swine	Liquid	FF	Midwest	3	124	Medium1a	32,228	580	5,742	0	0
5	Swine	Liquid	FF	Mid-Atlantic	1	182	Medium1a	34,688	1,482	1,543	1,067	0
5	Swine	Liquid	FF	Midwest	1	1639	Medium1a	33,312	1,244	1,510	811	0
5	Swine	Liquid	FF	Mid-Atlantic	2	13	Medium1a	26,383	1,127	1,806	693	0
5	Swine	Liquid	FF	Midwest	2	116	Medium1a	25,651	1,231	1,965	797	0
5	Swine	Liquid	FF	Mid-Atlantic	3	20	Medium1a	33,260	580	1,588	0	0
5	Swine	Liquid	FF	Midwest	3	186	Medium1a	32,228	580	1,742	0	0
5	Swine	Liquid	FF	Mid-Atlantic	1	81	Medium1b	55,580	745	1,523	291	0

Cost for Swine Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3 yr rec	5 yr rec
5	Swine	Liquid	FF	Midwest	1	728	Medium1b	53,646	695	1,642	237	0
5	Swine	Liquid	FF	Mid-Atlantic	2	6	Medium1b	41,288	685	13,364	227	0
5	Swine	Liquid	FF	Midwest	2	52	Medium1b	39,968	709	1,375	252	0
5	Swine	Liquid	FF	Mid-Atlantic	3	9	Medium1b	54,889	580	9,988	0	0
5	Swine	Liquid	FF	Midwest	3	83	Medium1b	53,024	580	9,820	0	0
5	Swine	Liquid	FF	Mid-Atlantic	1	122	Medium1b	57,035	2,199	2,416	1,822	0
5	Swine	Liquid	FF	Midwest	1	1093	Medium1b	54,552	1,771	2,198	1,362	0
5	Swine	Liquid	FF	Mid-Atlantic	2	8	Medium1b	41,731	1,127	7,032	693	0
5	Swine	Liquid	FF	Midwest	2	77	Medium1b	40,407	1,231	6,334	797	0
5	Swine	Liquid	FF	Mid-Atlantic	3	14	Medium1b	54,889	580	2,529	0	0
5	Swine	Liquid	FF	Midwest	3	124	Medium1b	53,024	580	2,646	0	0
5	Swine	Liquid	FF	Mid-Atlantic	1	54	Medium2	76,449	816	1,982	365	0
5	Swine	Liquid	FF	Midwest	1	278	Medium2	75,938	750	2,115	294	0
5	Swine	Liquid	FF	Mid-Atlantic	2	5	Medium2	56,079	720	18,865	264	0
5	Swine	Liquid	FF	Midwest	2	27	Medium2	55,787	752	1,713	297	0
5	Swine	Liquid	FF	Mid-Atlantic	3	8	Medium2	75,688	580	14,073	0	0
5	Swine	Liquid	FF	Midwest	3	42	Medium2	75,270	580	14,189	0	0
5	Swine	Liquid	FF	Mid-Atlantic	1	81	Medium2	78,524	2,889	3,256	2,549	0
5	Swine	Liquid	FF	Midwest	1	418	Medium2	77,274	2,336	2,935	1,952	0
5	Swine	Liquid	FF	Mid-Atlantic	2	8	Medium2	56,904	1,544	9,952	1,132	0
5	Swine	Liquid	FF	Midwest	2	41	Medium2	56,607	1,726	3,844	1,315	0
5	Swine	Liquid	FF	Mid-Atlantic	3	12	Medium2	75,688	580	3,434	0	0
5	Swine	Liquid	FF	Midwest	3	62	Medium2	75,270	580	3,614	0	0
5	Swine	Liquid	GF	Mid-Atlantic	1	115	Large1	119,903	738	2,566	255	0
5	Swine	Liquid	GF	Midwest	1	142	Large1	115,511	740	2,478	252	0
5	Swine	Liquid	GF	Mid-Atlantic	2	36	Large1	86,735	648	37,096	159	0
5	Swine	Liquid	GF	Midwest	2	44	Large1	83,621	699	6,641	209	0
5	Swine	Liquid	GF	Mid-Atlantic	3	32	Large1	119,757	580	29,432	0	0
5	Swine	Liquid	GF	Midwest	3	40	Large1	115,367	580	28,308	0	0

Cost for Swine Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3 yr rec	5 yr rec
5	Swine	Liquid	GF	Mid-Atlantic	1	173	Large1	119,937	2,124	2,587	1,750	0
5	Swine	Liquid	GF	Midwest	1	214	Large1	115,532	2,238	2,491	1,818	0
5	Swine	Liquid	GF	Mid-Atlantic	2	53	Large1	86,744	1,041	15,818	582	0
5	Swine	Liquid	GF	Midwest	2	66	Large1	83,631	1,379	13,680	920	0
5	Swine	Liquid	GF	Mid-Atlantic	3	49	Large1	119,757	580	6,146	0	0
5	Swine	Liquid	GF	Midwest	3	61	Large1	115,367	580	5,920	0	0
5	Swine	Liquid	GF	Mid-Atlantic	1	62	Large2	290,930	975	5,990	511	0
5	Swine	Liquid	GF	Midwest	1	31	Large2	327,306	1,050	6,716	576	0
5	Swine	Liquid	GF	Mid-Atlantic	2	72	Large2	208,003	760	37,346	279	0
5	Swine	Liquid	GF	Midwest	2	37	Large2	233,797	892	24,071	410	0
5	Swine	Liquid	GF	Mid-Atlantic	3	38	Large2	290,778	580	73,215	0	0
5	Swine	Liquid	GF	Midwest	3	19	Large2	327,157	580	82,531	0	0
5	Swine	Liquid	GF	Mid-Atlantic	1	92	Large2	291,015	4,444	6,042	4,252	0
5	Swine	Liquid	GF	Midwest	1	47	Large2	327,368	5,447	6,754	5,172	0
5	Swine	Liquid	GF	Mid-Atlantic	2	108	Large2	208,015	1,219	39,143	775	0
5	Swine	Liquid	GF	Midwest	2	55	Large2	233,808	1,689	39,587	1,244	0
5	Swine	Liquid	GF	Mid-Atlantic	3	56	Large2	290,778	580	14,948	0	0
5	Swine	Liquid	GF	Midwest	3	29	Large2	327,157	580	16,821	0	0
5	Swine	Liquid	GF	Mid-Atlantic	1	99	Medium1a	37,659	685	1,128	227	0
5	Swine	Liquid	GF	Midwest	1	573	Medium1a	35,584	651	1,258	191	0
5	Swine	Liquid	GF	Mid-Atlantic	2	12	Medium1a	28,569	639	10,456	180	0
5	Swine	Liquid	GF	Midwest	2	68	Medium1a	27,131	653	1,091	194	0
5	Swine	Liquid	GF	Mid-Atlantic	3	20	Medium1a	37,029	580	8,304	0	0
5	Swine	Liquid	GF	Midwest	3	118	Medium1a	34,999	580	7,986	0	0
5	Swine	Liquid	GF	Mid-Atlantic	1	148	Medium1a	38,581	1,607	1,695	1,198	0
5	Swine	Liquid	GF	Midwest	1	859	Medium1a	36,142	1,314	1,601	884	0
5	Swine	Liquid	GF	Mid-Atlantic	2	18	Medium1a	28,955	1,026	4,926	586	0
5	Swine	Liquid	GF	Midwest	2	103	Medium1a	27,516	1,110	2,234	671	0
5	Swine	Liquid	GF	Mid-Atlantic	3	31	Medium1a	37,029	580	1,995	0	0

Cost for Swine Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3 yr rec	5 yr rec
5	Swine	Liquid	GF	Midwest	3	176	Medium1a	34,999	580	2,089	0	0
5	Swine	Liquid	GF	Mid-Atlantic	1	18	Medium1b	55,676	746	1,525	292	0
5	Swine	Liquid	GF	Midwest	1	102	Medium1b	52,421	692	1,616	234	0
5	Swine	Liquid	GF	Mid-Atlantic	2	2	Medium1b	41,311	639	1,174	180	0
5	Swine	Liquid	GF	Midwest	2	12	Medium1b	39,051	651	15,442	191	0
5	Swine	Liquid	GF	Mid-Atlantic	3	4	Medium1b	54,985	580	12,882	0	0
5	Swine	Liquid	GF	Midwest	3	21	Medium1b	51,801	580	12,268	0	0
5	Swine	Liquid	GF	Mid-Atlantic	1	26	Medium1b	57,134	2,202	2,420	1,825	0
5	Swine	Liquid	GF	Midwest	1	154	Medium1b	53,303	1,740	2,158	1,329	0
5	Swine	Liquid	GF	Mid-Atlantic	2	3	Medium1b	41,698	1,026	7,365	586	0
5	Swine	Liquid	GF	Midwest	2	18	Medium1b	39,438	1,110	6,490	671	0
5	Swine	Liquid	GF	Mid-Atlantic	3	5	Medium1b	54,985	580	2,916	0	0
5	Swine	Liquid	GF	Midwest	3	32	Medium1b	51,801	580	2,951	0	0
5	Swine	Liquid	GF	Mid-Atlantic	1	49	Medium2	77,062	818	1,996	368	0
5	Swine	Liquid	GF	Midwest	1	126	Medium2	75,036	748	2,096	292	0
5	Swine	Liquid	GF	Mid-Atlantic	2	10	Medium2	56,501	709	23,148	253	0
5	Swine	Liquid	GF	Midwest	2	25	Medium2	55,134	734	17,748	278	0
5	Swine	Liquid	GF	Mid-Atlantic	3	12	Medium2	76,299	580	18,320	0	0
5	Swine	Liquid	GF	Midwest	3	30	Medium2	74,370	580	18,027	0	0
5	Swine	Liquid	GF	Mid-Atlantic	1	73	Medium2	79,155	2,909	3,281	2,570	0
5	Swine	Liquid	GF	Midwest	1	188	Medium2	76,355	2,313	2,905	1,928	0
5	Swine	Liquid	GF	Mid-Atlantic	2	14	Medium2	57,112	1,319	10,443	896	0
5	Swine	Liquid	GF	Midwest	2	37	Medium2	55,744	1,459	9,422	1,035	0
5	Swine	Liquid	GF	Mid-Atlantic	3	17	Medium2	76,299	580	4,011	0	0
5	Swine	Liquid	GF	Midwest	3	44	Medium2	74,370	580	4,110	0	0
5a	Swine	Liquid	FF	Mid-Atlantic	1	75	Large1	747,825	736	24,463	253	0
5a	Swine	Liquid	FF	Midwest	1	347	Large1	733,979	742	24,013	254	0
5a	Swine	Liquid	FF	Mid-Atlantic	2	12	Large1	649,731	668	25,565	181	0
5a	Swine	Liquid	FF	Midwest	2	58	Large1	637,703	739	24,234	251	0

Cost for Swine Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3 yr rec	5 yr rec
5a	Swine	Liquid	FF	Mid-Atlantic	3	14	Large1	649,660	580	24,460	0	0
5a	Swine	Liquid	FF	Midwest	3	65	Large1	637,631	580	24,011	0	0
5a	Swine	Liquid	FF	Mid-Atlantic	1	112	Large1	747,858	2,105	24,484	1,729	0
5a	Swine	Liquid	FF	Midwest	1	521	Large1	734,000	2,251	24,026	1,832	0
5a	Swine	Liquid	FF	Mid-Atlantic	2	19	Large1	649,742	1,134	32,648	682	0
5a	Swine	Liquid	FF	Midwest	2	87	Large1	637,714	1,541	25,741	1,089	0
5a	Swine	Liquid	FF	Mid-Atlantic	3	21	Large1	649,660	580	24,460	0	0
5a	Swine	Liquid	FF	Midwest	3	98	Large1	637,631	580	24,011	0	0
5a	Swine	Liquid	FF	Mid-Atlantic	1	58	Large2	3,646,138	1,340	118,656	905	0
5a	Swine	Liquid	FF	Midwest	1	122	Large2	2,943,571	1,228	95,820	762	0
5a	Swine	Liquid	FF	Mid-Atlantic	2	28	Large2	3,167,794	808	126,318	331	0
5a	Swine	Liquid	FF	Midwest	2	59	Large2	2,557,406	976	99,594	498	0
5a	Swine	Liquid	FF	Mid-Atlantic	3	34	Large2	3,167,808	580	118,644	0	0
5a	Swine	Liquid	FF	Midwest	3	73	Large2	2,557,404	580	95,814	0	0
5a	Swine	Liquid	FF	Mid-Atlantic	1	86	Large2	3,646,302	8,018	118,757	8,106	0
5a	Swine	Liquid	FF	Midwest	1	184	Large2	2,943,657	7,286	95,873	7,094	0
5a	Swine	Liquid	FF	Mid-Atlantic	2	41	Large2	3,167,816	1,724	171,037	1,319	0
5a	Swine	Liquid	FF	Midwest	2	88	Large2	2,557,428	2,566	106,414	2,160	0
5a	Swine	Liquid	FF	Mid-Atlantic	3	52	Large2	3,167,808	580	118,644	0	0
5a	Swine	Liquid	FF	Midwest	3	109	Large2	2,557,404	580	95,814	0	0
5a	Swine	Liquid	FF	Mid-Atlantic	1	122	Medium1a	181,384	672	6,247	214	0
5a	Swine	Liquid	FF	Midwest	1	1092	Medium1a	174,524	644	6,200	184	0
5a	Swine	Liquid	FF	Mid-Atlantic	2	9	Medium1a	173,451	689	6,381	232	0
5a	Swine	Liquid	FF	Midwest	2	78	Medium1a	166,929	709	6,356	252	0
5a	Swine	Liquid	FF	Mid-Atlantic	3	14	Medium1a	157,135	580	6,150	0	0
5a	Swine	Liquid	FF	Midwest	3	124	Medium1a	151,207	580	6,127	0	0
5a	Swine	Liquid	FF	Mid-Atlantic	1	182	Medium1a	182,195	1,482	6,745	1,067	0
5a	Swine	Liquid	FF	Midwest	1	1639	Medium1a	175,029	1,244	6,510	811	0
5a	Swine	Liquid	FF	Mid-Atlantic	2	13	Medium1a	158,135	1,127	7,818	693	0

Cost for Swine Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3 yr rec	5 yr rec
5a	Swine	Liquid	FF	Midwest	2	116	Medium1a	152,209	1,231	6,633	797	0
5a	Swine	Liquid	FF	Mid-Atlantic	3	20	Medium1a	157,135	580	6,150	0	0
5a	Swine	Liquid	FF	Midwest	3	186	Medium1a	151,207	580	6,127	0	0
5a	Swine	Liquid	FF	Mid-Atlantic	1	81	Medium1b	324,682	745	10,945	291	0
5a	Swine	Liquid	FF	Midwest	1	728	Medium1b	312,253	695	10,699	237	0
5a	Swine	Liquid	FF	Mid-Atlantic	2	6	Medium1b	282,121	685	11,376	227	0
5a	Swine	Liquid	FF	Midwest	2	52	Medium1b	298,576	709	10,855	252	0
5a	Swine	Liquid	FF	Mid-Atlantic	3	9	Medium1b	281,588	580	10,803	0	0
5a	Swine	Liquid	FF	Midwest	3	83	Medium1b	270,848	580	10,600	0	0
5a	Swine	Liquid	FF	Mid-Atlantic	1	122	Medium1b	326,137	2,199	11,838	1,822	0
5a	Swine	Liquid	FF	Midwest	1	1093	Medium1b	313,159	1,771	11,256	1,362	0
5a	Swine	Liquid	FF	Mid-Atlantic	2	8	Medium1b	282,564	1,127	14,910	693	0
5a	Swine	Liquid	FF	Midwest	2	77	Medium1b	271,826	1,231	11,808	797	0
5a	Swine	Liquid	FF	Mid-Atlantic	3	14	Medium1b	281,588	580	10,803	0	0
5a	Swine	Liquid	FF	Midwest	3	124	Medium1b	270,848	580	10,600	0	0
5a	Swine	Liquid	FF	Mid-Atlantic	1	54	Medium2	462,623	816	15,467	365	0
5a	Swine	Liquid	FF	Midwest	1	278	Medium2	459,759	750	15,518	294	0
5a	Swine	Liquid	FF	Mid-Atlantic	2	5	Medium2	401,935	720	16,098	264	0
5a	Swine	Liquid	FF	Midwest	2	27	Medium2	439,609	752	15,693	297	0
5a	Swine	Liquid	FF	Mid-Atlantic	3	8	Medium2	401,385	580	15,282	0	0
5a	Swine	Liquid	FF	Midwest	3	42	Medium2	398,978	580	15,391	0	0
5a	Swine	Liquid	FF	Mid-Atlantic	1	81	Medium2	464,698	2,889	16,742	2,549	0
5a	Swine	Liquid	FF	Midwest	1	418	Medium2	461,095	2,336	16,339	1,952	0
5a	Swine	Liquid	FF	Mid-Atlantic	2	8	Medium2	402,760	1,544	20,573	1,132	0
5a	Swine	Liquid	FF	Midwest	2	41	Medium2	400,353	1,726	16,960	1,315	0
5a	Swine	Liquid	FF	Mid-Atlantic	3	12	Medium2	401,385	580	15,282	0	0
5a	Swine	Liquid	FF	Midwest	3	62	Medium2	398,978	580	15,391	0	0
5a	Swine	Liquid	GF	Mid-Atlantic	1	115	Large1	757,409	738	24,775	255	0
5a	Swine	Liquid	GF	Midwest	1	142	Large1	728,228	740	23,826	252	0

Cost for Swine Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3 yr rec	5 yr rec
5a	Swine	Liquid	GF	Mid-Atlantic	2	36	Large1	658,057	648	26,184	159	0
5a	Swine	Liquid	GF	Midwest	2	44	Large1	632,705	699	24,558	209	0
5a	Swine	Liquid	GF	Mid-Atlantic	3	32	Large1	657,987	580	24,772	0	0
5a	Swine	Liquid	GF	Midwest	3	40	Large1	632,635	580	23,824	0	0
5a	Swine	Liquid	GF	Mid-Atlantic	1	173	Large1	757,443	2,124	24,796	1,750	0
5a	Swine	Liquid	GF	Midwest	1	214	Large1	728,249	2,238	23,839	1,818	0
5a	Swine	Liquid	GF	Mid-Atlantic	2	53	Large1	658,067	1,041	33,898	582	0
5a	Swine	Liquid	GF	Midwest	2	66	Large1	632,715	1,379	25,875	920	0
5a	Swine	Liquid	GF	Mid-Atlantic	3	49	Large1	657,987	580	24,772	0	0
5a	Swine	Liquid	GF	Midwest	3	61	Large1	632,635	580	23,824	0	0
5a	Swine	Liquid	GF	Mid-Atlantic	1	62	Large2	1,894,502	975	61,729	511	0
5a	Swine	Liquid	GF	Midwest	1	31	Large2	2,136,432	1,050	69,589	576	0
5a	Swine	Liquid	GF	Mid-Atlantic	2	72	Large2	1,645,966	760	64,952	279	0
5a	Swine	Liquid	GF	Midwest	2	37	Large2	1,856,159	892	72,043	410	0
5a	Swine	Liquid	GF	Mid-Atlantic	3	38	Large2	1,645,936	580	61,722	0	0
5a	Swine	Liquid	GF	Midwest	3	19	Large2	1,856,136	580	69,585	0	0
5a	Swine	Liquid	GF	Mid-Atlantic	1	92	Large2	1,894,588	4,444	61,781	4,252	0
5a	Swine	Liquid	GF	Midwest	1	47	Large2	2,136,494	5,447	69,627	5,172	0
5a	Swine	Liquid	GF	Mid-Atlantic	2	108	Large2	1,645,978	1,219	88,643	775	0
5a	Swine	Liquid	GF	Midwest	2	55	Large2	1,856,170	1,689	78,040	1,244	0
5a	Swine	Liquid	GF	Mid-Atlantic	3	56	Large2	1,645,936	580	61,722	0	0
5a	Swine	Liquid	GF	Midwest	3	29	Large2	1,856,136	580	69,585	0	0
5a	Swine	Liquid	GF	Mid-Atlantic	1	99	Medium1a	206,336	685	7,065	227	0
5a	Swine	Liquid	GF	Midwest	1	573	Medium1a	192,862	651	6,799	191	0
5a	Swine	Liquid	GF	Mid-Atlantic	2	12	Medium1a	179,313	639	7,404	180	0
5a	Swine	Liquid	GF	Midwest	2	68	Medium1a	184,409	653	6,926	194	0
5a	Swine	Liquid	GF	Mid-Atlantic	3	20	Medium1a	178,806	580	6,960	0	0
5a	Swine	Liquid	GF	Midwest	3	118	Medium1a	167,137	580	6,723	0	0
5a	Swine	Liquid	GF	Mid-Atlantic	1	148	Medium1a	207,259	1,607	7,632	1,198	0

Cost for Swine Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3 yr rec	5 yr rec
5a	Swine	Liquid	GF	Midwest	1	859	Medium1a	193,421	1,314	7,142	884	0
5a	Swine	Liquid	GF	Mid-Atlantic	2	18	Medium1a	179,700	1,026	9,337	586	0
5a	Swine	Liquid	GF	Midwest	2	103	Medium1a	168,034	1,110	7,414	671	0
5a	Swine	Liquid	GF	Mid-Atlantic	3	31	Medium1a	178,806	580	6,960	0	0
5a	Swine	Liquid	GF	Midwest	3	176	Medium1a	167,137	580	6,723	0	0
5a	Swine	Liquid	GF	Mid-Atlantic	1	18	Medium1b	325,321	746	10,966	292	0
5a	Swine	Liquid	GF	Midwest	1	102	Medium1b	304,152	692	10,435	234	0
5a	Swine	Liquid	GF	Mid-Atlantic	2	2	Medium1b	282,632	639	11,625	180	0
5a	Swine	Liquid	GF	Midwest	2	12	Medium1b	264,302	651	10,864	191	0
5a	Swine	Liquid	GF	Mid-Atlantic	3	4	Medium1b	282,143	580	10,824	0	0
5a	Swine	Liquid	GF	Midwest	3	21	Medium1b	263,811	580	10,337	0	0
5a	Swine	Liquid	GF	Mid-Atlantic	1	26	Medium1b	326,779	2,202	11,861	1,825	0
5a	Swine	Liquid	GF	Midwest	1	154	Medium1b	305,035	1,740	10,977	1,329	0
5a	Swine	Liquid	GF	Mid-Atlantic	2	3	Medium1b	283,019	1,026	15,225	586	0
5a	Swine	Liquid	GF	Midwest	2	18	Medium1b	264,688	1,110	11,597	671	0
5a	Swine	Liquid	GF	Mid-Atlantic	3	5	Medium1b	282,143	580	10,824	0	0
5a	Swine	Liquid	GF	Midwest	3	32	Medium1b	263,811	580	10,337	0	0
5a	Swine	Liquid	GF	Mid-Atlantic	1	49	Medium2	466,674	818	15,600	368	0
5a	Swine	Liquid	GF	Midwest	1	126	Medium2	453,791	748	15,324	292	0
5a	Swine	Liquid	GF	Mid-Atlantic	2	10	Medium2	405,442	709	16,287	253	0
5a	Swine	Liquid	GF	Midwest	2	25	Medium2	394,335	734	15,580	278	0
5a	Swine	Liquid	GF	Mid-Atlantic	3	12	Medium2	404,903	580	15,414	0	0
5a	Swine	Liquid	GF	Midwest	3	30	Medium2	393,794	580	15,197	0	0
5a	Swine	Liquid	GF	Mid-Atlantic	1	73	Medium2	468,767	2,909	16,885	2,570	0
5a	Swine	Liquid	GF	Midwest	1	188	Medium2	455,110	2,313	16,133	1,928	0
5a	Swine	Liquid	GF	Mid-Atlantic	2	14	Medium2	406,052	1,319	21,401	896	0
5a	Swine	Liquid	GF	Midwest	2	37	Medium2	394,945	1,459	16,944	1,035	0
5a	Swine	Liquid	GF	Mid-Atlantic	3	17	Medium2	404,903	580	15,414	0	0
5a	Swine	Liquid	GF	Midwest	3	44	Medium2	393,794	580	15,197		0

Cost for Swine Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3 yr rec	5 yr rec
											0	
6	Swine	Liquid	FF	Mid-Atlantic	1	112	Large1	98,256	42,105	-8,314	1,729	5,000
6	Swine	Liquid	FF	Midwest	1	521	Large1	155,263	42,251	-15	1,832	5,000
6	Swine	Liquid	FF	Mid-Atlantic	2	19	Large1	183,306	41,134	-3,580	682	5,000
6	Swine	Liquid	FF	Midwest	2	87	Large1	168,426	41,541	-5,311	1,089	5,000
6	Swine	Liquid	FF	Mid-Atlantic	3	21	Large1	215,897	40,580	-3,329	0	5,000
6	Swine	Liquid	FF	Midwest	3	98	Large1	273,151	40,580	-3,604	0	5,000
6	Swine	Liquid	FF	Mid-Atlantic	1	86	Large2	286,501	48,018	-32,752	8,106	5,000
6	Swine	Liquid	FF	Midwest	1	184	Large2	362,915	47,286	-43,278	7,094	5,000
6	Swine	Liquid	FF	Mid-Atlantic	2	41	Large2	679,948	41,724	-9,519	1,319	5,000
6	Swine	Liquid	FF	Midwest	2	88	Large2	795,452	42,566	-12,322	2,160	5,000
6	Swine	Liquid	FF	Mid-Atlantic	3	52	Large2	839,329	40,580	-8,860	0	5,000
6	Swine	Liquid	FF	Midwest	3	109	Large2	924,099	40,580	-9,710	0	5,000
6	Swine	Liquid	GF	Mid-Atlantic	1	173	Large1	98,039	27,124	-17,555	1,750	5,000
6	Swine	Liquid	GF	Midwest	1	214	Large1	155,261	27,238	-15,110	1,818	5,000
6	Swine	Liquid	GF	Mid-Atlantic	2	53	Large1	184,106	26,041	-12,464	582	5,000
6	Swine	Liquid	GF	Midwest	2	66	Large1	238,237	26,379	-10,717	920	5,000
6	Swine	Liquid	GF	Mid-Atlantic	3	49	Large1	217,119	25,580	-11,611	0	5,000
6	Swine	Liquid	GF	Midwest	3	61	Large1	269,973	25,580	-9,383	0	5,000
6	Swine	Liquid	GF	Mid-Atlantic	1	92	Large2	173,966	29,444	-42,722	4,252	5,000
6	Swine	Liquid	GF	Midwest	1	47	Large2	362,771	30,447	-43,296	5,172	5,000
6	Swine	Liquid	GF	Mid-Atlantic	2	108	Large2	381,013	26,219	-29,927	775	5,000
6	Swine	Liquid	GF	Midwest	2	55	Large2	595,597	26,689	-30,331	1,244	5,000
6	Swine	Liquid	GF	Mid-Atlantic	3	56	Large2	463,776	25,580	-28,015	0	5,000
6	Swine	Liquid	GF	Midwest	3	29	Large2	688,946	25,580	-26,702	0	5,000
7	Swine	Liquid	FF	Mid-Atlantic	1	75	Large1	640	736	181	253	6
7	Swine	Liquid	FF	Midwest	1	347	Large1	635	742	180	254	6
7	Swine	Liquid	FF	Mid-Atlantic	2	12	Large1	15,128	668	11,320	181	6
7	Swine	Liquid	FF	Midwest	2	58	Large1	14,994	739	11,220	251	6

Cost for Swine Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3 yr rec	5 yr rec
7	Swine	Liquid	FF	Mid-Atlantic	3	14	Large1	118,315	580	22,431	0	6
7	Swine	Liquid	FF	Midwest	3	65	Large1	116,232	580	22,021	0	6
7	Swine	Liquid	FF	Mid-Atlantic	1	112	Large1	674	2,105	202	1,729	6
7	Swine	Liquid	FF	Midwest	1	521	Large1	657	2,251	193	1,832	6
7	Swine	Liquid	FF	Mid-Atlantic	2	19	Large1	89,254	1,134	25,880	682	6
7	Swine	Liquid	FF	Midwest	2	87	Large1	15,005	1,541	21,096	1,089	6
7	Swine	Liquid	FF	Mid-Atlantic	3	21	Large1	118,315	580	5,187	0	6
7	Swine	Liquid	FF	Midwest	3	98	Large1	116,232	580	5,097	0	6
7	Swine	Liquid	FF	Mid-Atlantic	1	58	Large2	1,139	1,340	200	905	6
7	Swine	Liquid	FF	Midwest	1	122	Large2	1,040	1,228	192	762	6
7	Swine	Liquid	FF	Mid-Atlantic	2	28	Large2	403,602	808	36,073	331	6
7	Swine	Liquid	FF	Midwest	2	59	Large2	32,639	976	24,477	498	6
7	Swine	Liquid	FF	Mid-Atlantic	3	34	Large2	554,131	580	108,310	0	6
7	Swine	Liquid	FF	Midwest	3	73	Large2	448,511	580	87,492	0	6
7	Swine	Liquid	FF	Mid-Atlantic	1	86	Large2	1,303	8,018	300	8,106	6
7	Swine	Liquid	FF	Midwest	1	184	Large2	1,126	7,286	245	7,094	6
7	Swine	Liquid	FF	Mid-Atlantic	2	41	Large2	403,625	1,724	98,773	1,319	6
7	Swine	Liquid	FF	Midwest	2	88	Large2	327,560	2,566	75,249	2,160	6
7	Swine	Liquid	FF	Mid-Atlantic	3	52	Large2	554,131	580	24,192	0	6
7	Swine	Liquid	FF	Midwest	3	109	Large2	448,511	580	19,586	0	0
7	Swine	Liquid	FF	Mid-Atlantic	1	122	Medium1a	1,242	672	392	214	0
7	Swine	Liquid	FF	Midwest	1	1092	Medium1a	1,196	644	567	184	0
7	Swine	Liquid	FF	Mid-Atlantic	2	9	Medium1a	10,594	689	6,778	232	0
7	Swine	Liquid	FF	Midwest	2	78	Medium1a	10,476	709	6,900	252	0
7	Swine	Liquid	FF	Mid-Atlantic	3	14	Medium1a	33,260	580	5,745	0	0
7	Swine	Liquid	FF	Midwest	3	124	Medium1a	32,228	580	5,742	0	0
7	Swine	Liquid	FF	Mid-Atlantic	1	182	Medium1a	2,053	1,482	890	1,067	0
7	Swine	Liquid	FF	Midwest	1	1639	Medium1a	1,701	1,244	878	811	0
7	Swine	Liquid	FF	Mid-Atlantic	2	13	Medium1a	11,033	1,127	7,687	693	0

Cost for Swine Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3 yr rec	5 yr rec
7	Swine	Liquid	FF	Midwest	2	116	Medium1a	10,915	1,231	7,170	797	731
7	Swine	Liquid	FF	Mid-Atlantic	3	20	Medium1a	33,260	580	1,588	0	0
7	Swine	Liquid	FF	Midwest	3	186	Medium1a	32,228	580	1,742	0	0
7	Swine	Liquid	FF	Mid-Atlantic	1	81	Medium1b	1,449	745	440	291	0
7	Swine	Liquid	FF	Midwest	1	728	Medium1b	1,370	695	596	237	0
7	Swine	Liquid	FF	Mid-Atlantic	2	6	Medium1b	12,776	685	8,185	227	55,197
7	Swine	Liquid	FF	Midwest	2	52	Medium1b	12,605	709	8,273	252	0
7	Swine	Liquid	FF	Mid-Atlantic	3	9	Medium1b	54,889	580	9,988	0	0
7	Swine	Liquid	FF	Midwest	3	83	Medium1b	53,024	580	9,820	0	0
7	Swine	Liquid	FF	Mid-Atlantic	1	122	Medium1b	2,904	2,199	1,334	1,822	0
7	Swine	Liquid	FF	Midwest	1	1093	Medium1b	2,276	1,771	1,153	1,362	0
7	Swine	Liquid	FF	Mid-Atlantic	2	8	Medium1b	45,508	1,127	14,816	693	0
7	Swine	Liquid	FF	Midwest	2	77	Medium1b	13,044	1,231	17,364	797	0
7	Swine	Liquid	FF	Mid-Atlantic	3	14	Medium1b	54,889	580	2,529	0	0
7	Swine	Liquid	FF	Midwest	3	124	Medium1b	53,024	580	2,646	0	0
7	Swine	Liquid	FF	Mid-Atlantic	1	54	Medium2	1,621	816	485	365	0
7	Swine	Liquid	FF	Midwest	1	278	Medium2	1,526	750	627	294	0
7	Swine	Liquid	FF	Mid-Atlantic	2	5	Medium2	14,634	720	9,387	264	89,706
7	Swine	Liquid	FF	Midwest	2	27	Medium2	14,604	752	9,566	297	0
7	Swine	Liquid	FF	Mid-Atlantic	3	8	Medium2	75,688	580	14,073	0	0
7	Swine	Liquid	FF	Midwest	3	42	Medium2	75,270	580	14,189	0	0
7	Swine	Liquid	FF	Mid-Atlantic	1	81	Medium2	3,696	2,889	1,760	2,549	0
7	Swine	Liquid	FF	Midwest	1	418	Medium2	2,862	2,336	1,447	1,952	0
7	Swine	Liquid	FF	Mid-Atlantic	2	8	Medium2	61,253	1,544	18,916	1,132	0
7	Swine	Liquid	FF	Midwest	2	41	Medium2	15,424	1,726	11,697	1,315	0
7	Swine	Liquid	FF	Mid-Atlantic	3	12	Medium2	75,688	580	3,434	0	0
7	Swine	Liquid	FF	Midwest	3	62	Medium2	75,270	580	3,614	0	0
7	Swine	Liquid	GF	Mid-Atlantic	1	115	Large1	643	738	181	255	0
7	Swine	Liquid	GF	Midwest	1	142	Large1	634	740	180	252	0

Cost for Swine Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3 yr rec	5 yr rec
7	Swine	Liquid	GF	Mid-Atlantic	2	36	Large1	15,218	648	11,387	159	207,255
7	Swine	Liquid	GF	Midwest	2	44	Large1	14,937	699	11,178	209	85,939
7	Swine	Liquid	GF	Mid-Atlantic	3	32	Large1	119,757	580	29,432	0	0
7	Swine	Liquid	GF	Midwest	3	40	Large1	115,367	580	28,308	0	0
7	Swine	Liquid	GF	Mid-Atlantic	1	173	Large1	677	2,124	202	1,750	0
7	Swine	Liquid	GF	Midwest	1	214	Large1	655	2,238	193	1,818	0
7	Swine	Liquid	GF	Mid-Atlantic	2	53	Large1	90,296	1,041	27,027	582	0
7	Swine	Liquid	GF	Midwest	2	66	Large1	87,116	1,379	24,680	920	0
7	Swine	Liquid	GF	Mid-Atlantic	3	49	Large1	119,757	580	6,146	0	0
7	Swine	Liquid	GF	Midwest	3	61	Large1	115,367	580	5,920	0	0
7	Swine	Liquid	GF	Mid-Atlantic	1	62	Large2	883	975	189	511	0
7	Swine	Liquid	GF	Midwest	1	31	Large2	920	1,050	188	576	0
7	Swine	Liquid	GF	Mid-Atlantic	2	72	Large2	24,844	760	18,609	279	498,323
7	Swine	Liquid	GF	Midwest	2	37	Large2	26,702	892	20,006	410	342,942
7	Swine	Liquid	GF	Mid-Atlantic	3	38	Large2	290,778	580	73,215	0	0
7	Swine	Liquid	GF	Midwest	3	19	Large2	327,157	580	82,531	0	0
7	Swine	Liquid	GF	Mid-Atlantic	1	92	Large2	968	4,444	241	4,252	0
7	Swine	Liquid	GF	Midwest	1	47	Large2	982	5,447	227	5,172	0
7	Swine	Liquid	GF	Mid-Atlantic	2	108	Large2	213,853	1,219	57,568	775	0
7	Swine	Liquid	GF	Midwest	2	55	Large2	240,089	1,689	59,408	1,244	0
7	Swine	Liquid	GF	Mid-Atlantic	3	56	Large2	290,778	580	14,948	0	0
7	Swine	Liquid	GF	Midwest	3	29	Large2	327,157	580	16,821	0	0
7	Swine	Liquid	GF	Mid-Atlantic	1	99	Medium1a	1,281	685	401	227	0
7	Swine	Liquid	GF	Midwest	1	573	Medium1a	1,222	651	571	191	0
7	Swine	Liquid	GF	Mid-Atlantic	2	12	Medium1a	10,958	639	7,014	180	41,347
7	Swine	Liquid	GF	Midwest	2	68	Medium1a	10,740	653	7,072	194	0
7	Swine	Liquid	GF	Mid-Atlantic	3	20	Medium1a	37,029	580	8,304	0	0
7	Swine	Liquid	GF	Midwest	3	118	Medium1a	34,999	580	7,986	0	0
7	Swine	Liquid	GF	Mid-Atlantic	1	148	Medium1a	2,204	1,607	968	1,198	0

Cost for Swine Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3 yr rec	5 yr rec
7	Swine	Liquid	GF	Midwest	1	859	Medium1a	1,780	1,314	914	884	0
7	Swine	Liquid	GF	Mid-Atlantic	2	18	Medium1a	32,178	1,026	11,569	586	0
7	Swine	Liquid	GF	Midwest	2	103	Medium1a	11,125	1,110	8,215	671	0
7	Swine	Liquid	GF	Mid-Atlantic	3	31	Medium1a	37,029	580	1,995	0	0
7	Swine	Liquid	GF	Midwest	3	176	Medium1a	34,999	580	2,089	0	0
7	Swine	Liquid	GF	Mid-Atlantic	1	18	Medium1b	1,449	746	440	292	0
7	Swine	Liquid	GF	Midwest	1	102	Medium1b	1,360	692	595	234	0
7	Swine	Liquid	GF	Mid-Atlantic	2	2	Medium1b	45,091	639	8,964	180	0
7	Swine	Liquid	GF	Midwest	2	12	Medium1b	12,441	651	8,169	191	50,244
7	Swine	Liquid	GF	Mid-Atlantic	3	4	Medium1b	54,985	580	12,882	0	0
7	Swine	Liquid	GF	Midwest	3	21	Medium1b	51,801	580	12,268	0	0
7	Swine	Liquid	GF	Mid-Atlantic	1	26	Medium1b	2,907	2,202	1,336	1,825	0
7	Swine	Liquid	GF	Midwest	1	154	Medium1b	2,243	1,740	1,137	1,329	0
7	Swine	Liquid	GF	Mid-Atlantic	2	3	Medium1b	45,478	1,026	15,155	586	0
7	Swine	Liquid	GF	Midwest	2	18	Medium1b	43,124	1,110	14,088	671	0
7	Swine	Liquid	GF	Mid-Atlantic	3	5	Medium1b	54,985	580	2,916	0	0
7	Swine	Liquid	GF	Midwest	3	32	Medium1b	51,801	580	2,951	0	0
7	Swine	Liquid	GF	Mid-Atlantic	1	49	Medium2	1,626	818	487	368	0
7	Swine	Liquid	GF	Midwest	1	126	Medium2	1,520	748	625	292	0
7	Swine	Liquid	GF	Mid-Atlantic	2	10	Medium2	14,676	709	9,415	253	100,722
7	Swine	Liquid	GF	Midwest	2	25	Medium2	14,513	734	9,508	278	15,133
7	Swine	Liquid	GF	Mid-Atlantic	3	12	Medium2	76,299	580	18,320	0	0
7	Swine	Liquid	GF	Midwest	3	30	Medium2	74,370	580	18,027	0	0
7	Swine	Liquid	GF	Mid-Atlantic	1	73	Medium2	3,719	2,909	1,772	2,570	0
7	Swine	Liquid	GF	Midwest	1	188	Medium2	2,839	2,313	1,435	1,928	0
7	Swine	Liquid	GF	Mid-Atlantic	2	14	Medium2	61,477	1,319	19,440	896	0
7	Swine	Liquid	GF	Midwest	2	37	Medium2	60,058	1,459	18,314	1,035	0
7	Swine	Liquid	GF	Mid-Atlantic	3	17	Medium2	76,299	580	4,011	0	0
7	Swine	Liquid	GF	Midwest	3	44	Medium2	74,370	580	4,110	0	0

Regulatory Compliance Costs for the Poultry (BR, broiler; LA, dry layers; LW, wet layers) Operations

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
1	Chic	Solid	BR	Mid-Atlantic	1	47	Large1	64,538	2,214	2,249	2,391	0
1	Chic	Solid	BR	South	1	98	Large1	65,498	2,453	2,432	2,740	0
1	Chic	Solid	BR	Mid-Atlantic	2	687	Large1	63,405	890	2,289	536	0
1	Chic	Solid	BR	South	2	1,417	Large1	63,932	851	2,158	496	0
1	Chic	Solid	BR	Mid-Atlantic	3	336	Large1	62,675	580	1,355	0	0
1	Chic	Solid	BR	South	3	694	Large1	63,142	580	1,268	0	0
1	Chic	Solid	BR	Mid-Atlantic	1	7	Large2	168,396	4,878	4,342	6,120	0
1	Chic	Solid	BR	South	1	21	Large2	155,678	5,064	4,659	6,395	0
1	Chic	Solid	BR	Mid-Atlantic	2	132	Large2	165,119	1,047	3,439	756	0
1	Chic	Solid	BR	South	2	301	Large2	151,693	988	3,248	688	0
1	Chic	Solid	BR	Mid-Atlantic	3	53	Large2	164,255	580	2,049	0	0
1	Chic	Solid	BR	South	3	147	Large2	150,769	580	1,927	0	0
1	Chic	Solid	BR	Mid-Atlantic	1	108	Medium1a	21,127	1,075	1,351	791	0
1	Chic	Solid	BR	South	1	170	Medium1a	20,967	1,172	1,383	946	0
1	Chic	Solid	BR	Mid-Atlantic	2	904	Medium1a	20,831	747	1,362	331	0
1	Chic	Solid	BR	South	2	1,430	Medium1a	20,547	736	1,382	336	0
1	Chic	Solid	BR	Mid-Atlantic	3	677	Medium1a	20,239	580	1,043	0	0
1	Chic	Solid	BR	South	3	1,072	Medium1a	19,872	580	992	0	0
1	Chic	Solid	BR	Mid-Atlantic	1	50	Medium1b	29,305	1,274	1,539	1,069	0
1	Chic	Solid	BR	South	1	78	Medium1b	29,076	1,410	1,614	1,279	0
1	Chic	Solid	BR	Mid-Atlantic	2	415	Medium1b	28,830	747	1,559	331	0
1	Chic	Solid	BR	South	2	656	Medium1b	28,427	736	1,614	336	0
1	Chic	Solid	BR	Mid-Atlantic	3	311	Medium1b	28,237	580	1,122	0	0
1	Chic	Solid	BR	South	3	491	Medium1b	27,751	580	1,083	0	0
1	Chic	Solid	BR	Mid-Atlantic	1	61	Medium2	41,467	1,570	1,714	1,483	0
1	Chic	Solid	BR	South	1	122	Medium2	41,417	1,772	1,838	1,786	0
1	Chic	Solid	BR	Mid-Atlantic	2	737	Medium2	40,767	794	1,744	397	0
1	Chic	Solid	BR	South	2	1,467	Medium2	40,467	787	1,772	407	0

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
1	Chic	Solid	BR	Mid-Atlantic	3	486	Medium2	40,132	580	1,133	0	0
1	Chic	Solid	BR	South	3	967	Medium2	39,743	580	1,092	0	0
1	Chic	Solid	LA	Midwest	1	2	Large1	59,137	2,901	1,123	4,426	0
1	Chic	Solid	LA	South	1	4	Large1	52,774	2,430	1,457	3,441	0
1	Chic	Solid	LA	Midwest	2	102	Large1	58,186	875	1,235	660	0
1	Chic	Solid	LA	South	2	127	Large1	51,323	821	1,315	545	0
1	Chic	Solid	LA	Midwest	3	115	Large1	57,840	580	439	0	0
1	Chic	Solid	LA	South	3	144	Large1	50,843	580	412	0	0
1	Chic	Solid	LA	Midwest	1	0	Large2	259,389	10,799	4,442	19,106	0
1	Chic	Solid	LA	South	1	0	Large2	158,261	6,153	4,120	10,143	0
1	Chic	Solid	LA	Midwest	2	23	Large2	254,878	1,187	3,101	1,239	0
1	Chic	Solid	LA	South	2	40	Large2	153,681	1,076	2,848	1,004	0
1	Chic	Solid	LA	Midwest	3	26	Large2	254,386	580	1,481	0	0
1	Chic	Solid	LA	South	3	45	Large2	152,971	580	1,012	0	0
1	Chic	Solid	LA	Midwest	1	10	Medium1a	8,268	895	272	697	0
1	Chic	Solid	LA	South	1	9	Medium1a	6,146	784	292	478	0
1	Chic	Solid	LA	Midwest	2	84	Medium1a	8,187	722	317	376	0
1	Chic	Solid	LA	South	2	78	Medium1a	6,067	696	307	321	0
1	Chic	Solid	LA	Midwest	3	46	Medium1a	7,913	580	166	0	0
1	Chic	Solid	LA	South	3	43	Medium1a	5,700	580	159	0	0
1	Chic	Solid	LA	Midwest	1	6	Medium1b	11,362	1,017	333	924	0
1	Chic	Solid	LA	South	1	6	Medium1b	8,384	863	338	621	0
1	Chic	Solid	LA	Midwest	2	55	Medium1b	11,224	722	412	376	0
1	Chic	Solid	LA	South	2	52	Medium1b	8,234	696	368	321	0
1	Chic	Solid	LA	Midwest	3	30	Medium1b	10,950	580	192	0	0
1	Chic	Solid	LA	South	3	29	Medium1b	7,867	580	161	0	0
1	Chic	Solid	LA	Midwest	1	18	Medium2	20,828	1,390	470	1,618	0
1	Chic	Solid	LA	South	1	20	Medium2	17,759	1,194	572	1,216	0
1	Chic	Solid	LA	Midwest	2	146	Medium2	20,582	865	610	641	0

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
1	Chic	Solid	LA	South	2	176	Medium2	17,415	813	640	530	0
1	Chic	Solid	LA	Midwest	3	117	Medium2	20,240	580	221	0	0
1	Chic	Solid	LA	South	3	142	Medium2	16,943	580	212	0	0
1	Chic	Liquid	LW	South	1	24	Large1	1,053	1,128	460	1,097	0
1	Chic	Liquid	LW	South	2	217	Large1	107,287	799	23,262	505	0
1	Chic	Liquid	LW	South	3	119	Large1	106,827	580	7,046	0	0
1	Chic	Liquid	LW	South	1	97	Medium2	415	603	166	153	0
1	Chic	Liquid	LW	South	2	393	Medium2	10,221	590	1,232	130	0
1	Chic	Liquid	LW	South	3	310	Medium2	9,949	580	530	0	0
2	Chic	Solid	BR	Mid-Atlantic	1	28	Large1	65,240	3,036	2,680	3,541	0
2	Chic	Solid	BR	South	1	39	Large1	67,908	4,917	3,912	6,189	0
2	Chic	Solid	BR	Mid-Atlantic	2	412	Large1	63,427	916	6,327	573	0
2	Chic	Solid	BR	South	2	567	Large1	63,964	884	3,538	543	0
2	Chic	Solid	BR	Mid-Atlantic	3	202	Large1	62,675	580	1,355	0	0
2	Chic	Solid	BR	South	3	278	Large1	63,142	580	1,268	0	0
2	Chic	Solid	BR	Mid-Atlantic	1	4	Large2	170,244	7,038	5,476	9,144	0
2	Chic	Solid	BR	South	1	8	Large2	161,445	10,963	8,201	14,653	0
2	Chic	Solid	BR	Mid-Atlantic	2	79	Large2	165,162	1,097	10,330	827	0
2	Chic	Solid	BR	South	2	120	Large2	151,736	1,033	5,286	751	0
2	Chic	Solid	BR	Mid-Atlantic	3	32	Large2	164,255	580	2,049	0	0
2	Chic	Solid	BR	South	3	59	Large2	150,769	580	1,927	0	0
2	Chic	Solid	BR	Mid-Atlantic	1	65	Medium1a	21,351	1,324	1,488	1,139	0
2	Chic	Solid	BR	South	1	68	Medium1a	21,717	1,950	1,844	2,036	0
2	Chic	Solid	BR	Mid-Atlantic	2	542	Medium1a	20,856	774	2,481	369	0
2	Chic	Solid	BR	South	2	572	Medium1a	20,571	761	1,849	371	0
2	Chic	Solid	BR	Mid-Atlantic	3	406	Medium1a	20,239	580	1,043	0	0
2	Chic	Solid	BR	South	3	429	Medium1a	19,872	580	992	0	0
2	Chic	Solid	BR	Mid-Atlantic	1	30	Medium1b	29,619	1,623	1,732	1,557	0
2	Chic	Solid	BR	South	1	31	Medium1b	30,128	2,501	2,261	2,807	0

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
2	Chic	Solid	BR	Mid-Atlantic	2	249	Medium1b	28,854	774	3,268	369	0
2	Chic	Solid	BR	South	2	262	Medium1b	28,451	761	2,269	371	0
2	Chic	Solid	BR	Mid-Atlantic	3	187	Medium1b	28,237	580	1,122	0	0
2	Chic	Solid	BR	South	3	196	Medium1b	27,751	580	1,083	0	0
2	Chic	Solid	BR	Mid-Atlantic	1	37	Medium2	41,915	2,067	1,990	2,180	0
2	Chic	Solid	BR	South	1	49	Medium2	42,929	3,340	2,766	3,982	0
2	Chic	Solid	BR	Mid-Atlantic	2	442	Medium2	40,791	821	4,249	435	0
2	Chic	Solid	BR	South	2	587	Medium2	40,485	805	2,779	432	0
2	Chic	Solid	BR	Mid-Atlantic	3	292	Medium2	40,132	580	1,133	0	0
2	Chic	Solid	BR	South	3	387	Medium2	39,743	580	1,092	0	0
2	Chic	Solid	LA	Midwest	1	1	Large1	65,120	15,651	4,798	28,125	0
2	Chic	Solid	LA	South	1	2	Large1	61,940	12,589	7,086	21,728	0
2	Chic	Solid	LA	Midwest	2	61	Large1	58,227	962	2,370	822	0
2	Chic	Solid	LA	South	2	51	Large1	51,387	892	3,330	674	0
2	Chic	Solid	LA	Midwest	3	69	Large1	57,840	580	439	0	0
2	Chic	Solid	LA	South	3	58	Large1	50,843	580	412	0	0
2	Chic	Solid	LA	Midwest	1	0	Large2	285,727	66,923	20,617	123,431	0
2	Chic	Solid	LA	South	1	0	Large2	185,877	36,762	21,080	65,239	0
2	Chic	Solid	LA	Midwest	2	14	Large2	254,898	1,230	4,751	1,319	0
2	Chic	Solid	LA	South	2	16	Large2	153,712	1,111	5,955	1,067	0
2	Chic	Solid	LA	Midwest	3	16	Large2	254,386	580	1,481	0	0
2	Chic	Solid	LA	South	3	18	Large2	152,971	580	1,012	0	0
2	Chic	Solid	LA	Midwest	1	6	Medium1a	9,081	2,626	771	3,914	0
2	Chic	Solid	LA	South	1	4	Medium1a	7,157	1,905	913	2,495	0
2	Chic	Solid	LA	Midwest	2	50	Medium1a	8,203	757	499	439	0
2	Chic	Solid	LA	South	2	31	Medium1a	6,092	724	571	371	0
2	Chic	Solid	LA	Midwest	3	28	Medium1a	7,913	580	166	0	0
2	Chic	Solid	LA	South	3	17	Medium1a	5,700	580	159	0	0
2	Chic	Solid	LA	Midwest	1	4	Medium1b	12,489	3,418	1,025	5,387	0

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
2	Chic	Solid	LA	South	1	2	Medium1b	9,787	2,417	1,199	3,419	0
2	Chic	Solid	LA	Midwest	2	33	Medium1b	11,240	757	639	439	0
2	Chic	Solid	LA	South	2	21	Medium1b	8,259	724	709	371	0
2	Chic	Solid	LA	Midwest	3	18	Medium1b	10,950	580	192	0	0
2	Chic	Solid	LA	South	3	12	Medium1b	7,867	580	161	0	0
2	Chic	Solid	LA	Midwest	1	11	Medium2	22,917	5,842	1,753	9,892	0
2	Chic	Solid	LA	South	1	8	Medium2	20,801	4,566	2,440	7,285	0
2	Chic	Solid	LA	Midwest	2	88	Medium2	20,621	949	1,043	797	0
2	Chic	Solid	LA	South	2	70	Medium2	17,477	881	1,373	654	0
2	Chic	Solid	LA	Midwest	3	70	Medium2	20,240	580	221	0	0
2	Chic	Solid	LA	South	3	57	Medium2	16,943	580	212	0	0
2	Chic	Liquid	LW	South	1	10	Large1	3,767	4,135	2,126	6,511	0
2	Chic	Liquid	LW	South	2	87	Large1	107,325	841	20,209	580	0
2	Chic	Liquid	LW	South	3	48	Large1	106,827	580	2,745	0	0
2	Chic	Liquid	LW	South	1	39	Medium2	529	729	236	380	0
2	Chic	Liquid	LW	South	2	157	Medium2	10,259	632	1,126	205	0
2	Chic	Liquid	LW	South	3	124	Medium2	9,949	580	350	0	0
3	Chic	Solid	BR	Mid-Atlantic	1	4	Large1	69,049	2,214	3,281	2,391	3,082
3	Chic	Solid	BR	South	1	13	Large1	69,793	2,453	3,402	2,740	3,082
3	Chic	Solid	BR	Mid-Atlantic	2	66	Large1	67,916	890	3,321	536	3,082
3	Chic	Solid	BR	South	2	191	Large1	68,226	851	3,128	496	3,082
3	Chic	Solid	BR	Mid-Atlantic	3	32	Large1	67,187	580	2,387	0	3,082
3	Chic	Solid	BR	South	3	93	Large1	67,437	580	2,238	0	3,082
3	Chic	Solid	BR	Mid-Atlantic	1	7	Large1	69,752	3,036	3,712	3,541	3,082
3	Chic	Solid	BR	South	1	9	Large1	72,202	4,917	4,882	6,189	3,082
3	Chic	Solid	BR	Mid-Atlantic	2	99	Large1	67,938	916	7,359	573	3,082
3	Chic	Solid	BR	South	2	127	Large1	68,259	884	4,508	543	3,082
3	Chic	Solid	BR	Mid-Atlantic	3	48	Large1	67,187	580	2,387	0	3,082
3	Chic	Solid	BR	South	3	62	Large1	67,437	580	2,238	0	3,082

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
3	Chic	Solid	BR	Mid-Atlantic	1	1	Large2	178,012	4,878	5,475	6,120	3,082
3	Chic	Solid	BR	South	1	3	Large2	164,153	5,064	5,712	6,395	3,082
3	Chic	Solid	BR	Mid-Atlantic	2	13	Large2	174,735	1,047	4,572	756	3,082
3	Chic	Solid	BR	South	2	41	Large2	160,168	988	4,301	688	3,082
3	Chic	Solid	BR	Mid-Atlantic	3	5	Large2	173,871	580	3,182	0	3,082
3	Chic	Solid	BR	South	3	20	Large2	159,244	580	2,980	0	3,082
3	Chic	Solid	BR	Mid-Atlantic	1	1	Large2	179,859	7,038	6,609	9,144	3,082
3	Chic	Solid	BR	South	1	2	Large2	169,920	10,963	9,254	14,653	3,082
3	Chic	Solid	BR	Mid-Atlantic	2	19	Large2	174,778	1,097	11,463	827	3,082
3	Chic	Solid	BR	South	2	27	Large2	160,211	1,033	6,338	751	3,082
3	Chic	Solid	BR	Mid-Atlantic	3	8	Large2	173,871	580	3,182	0	3,082
3	Chic	Solid	BR	South	3	13	Large2	159,244	580	2,980	0	3,082
3	Chic	Solid	BR	Mid-Atlantic	1	10	Medium1a	23,506	1,075	2,340	791	3,082
3	Chic	Solid	BR	South	1	23	Medium1a	23,197	1,172	2,312	946	3,082
3	Chic	Solid	BR	Mid-Atlantic	2	86	Medium1a	23,210	747	2,352	331	3,082
3	Chic	Solid	BR	South	2	193	Medium1a	22,777	736	2,311	336	3,082
3	Chic	Solid	BR	Mid-Atlantic	3	65	Medium1a	22,618	580	2,033	0	3,082
3	Chic	Solid	BR	South	3	144	Medium1a	22,101	580	1,921	0	3,082
3	Chic	Solid	BR	Mid-Atlantic	1	15	Medium1a	23,730	1,324	2,478	1,139	3,082
3	Chic	Solid	BR	South	1	15	Medium1a	23,947	1,950	2,772	2,036	3,082
3	Chic	Solid	BR	Mid-Atlantic	2	130	Medium1a	23,235	774	3,470	369	3,082
3	Chic	Solid	BR	South	2	128	Medium1a	22,801	761	2,778	371	3,082
3	Chic	Solid	BR	Mid-Atlantic	3	97	Medium1a	22,618	580	2,033	0	3,082
3	Chic	Solid	BR	South	3	96	Medium1a	22,101	580	1,921	0	3,082
3	Chic	Solid	BR	Mid-Atlantic	1	5	Medium1b	32,086	1,274	2,537	1,069	3,082
3	Chic	Solid	BR	South	1	11	Medium1b	31,682	1,410	2,551	1,279	3,082
3	Chic	Solid	BR	Mid-Atlantic	2	40	Medium1b	31,611	747	2,556	331	3,082
3	Chic	Solid	BR	South	2	88	Medium1b	31,032	736	2,550	336	3,082
3	Chic	Solid	BR	Mid-Atlantic	3	30	Medium1b	31,019	580	2,119	0	3,082

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
3	Chic	Solid	BR	South	3	66	Medium1b	30,357	580	2,020	0	3,082
3	Chic	Solid	BR	Mid-Atlantic	1	7	Medium1b	32,400	1,623	2,730	1,557	3,082
3	Chic	Solid	BR	South	1	7	Medium1b	32,734	2,501	3,197	2,807	3,082
3	Chic	Solid	BR	Mid-Atlantic	2	60	Medium1b	31,636	774	4,266	369	3,082
3	Chic	Solid	BR	South	2	59	Medium1b	31,057	761	3,206	371	3,082
3	Chic	Solid	BR	Mid-Atlantic	3	45	Medium1b	31,019	580	2,119	0	3,082
3	Chic	Solid	BR	South	3	44	Medium1b	30,357	580	2,020	0	3,082
3	Chic	Solid	BR	Mid-Atlantic	1	6	Medium2	44,846	1,570	2,724	1,483	3,082
3	Chic	Solid	BR	South	1	16	Medium2	44,594	1,772	2,786	1,786	3,082
3	Chic	Solid	BR	Mid-Atlantic	2	70	Medium2	44,146	794	2,753	397	3,082
3	Chic	Solid	BR	South	2	198	Medium2	43,645	787	2,720	407	3,082
3	Chic	Solid	BR	Mid-Atlantic	3	46	Medium2	43,511	580	2,142	0	3,082
3	Chic	Solid	BR	South	3	130	Medium2	42,920	580	2,040	0	3,082
3	Chic	Solid	BR	Mid-Atlantic	1	9	Medium2	45,294	2,067	2,999	2,180	3,082
3	Chic	Solid	BR	South	1	11	Medium2	46,106	3,340	3,714	3,982	3,082
3	Chic	Solid	BR	Mid-Atlantic	2	106	Medium2	44,170	821	5,258	435	3,082
3	Chic	Solid	BR	South	2	132	Medium2	43,662	805	3,726	432	3,082
3	Chic	Solid	BR	Mid-Atlantic	3	70	Medium2	43,511	580	2,142	0	3,082
3	Chic	Solid	BR	South	3	87	Medium2	42,920	580	2,040	0	3,082
3	Chic	Solid	LA	Midwest	1	0	Large1	62,939	2,901	2,281	4,426	2,746
3	Chic	Solid	LA	South	1	1	Large1	55,975	2,430	2,405	3,441	1,849
3	Chic	Solid	LA	Midwest	2	11	Large1	61,988	875	2,393	660	2,746
3	Chic	Solid	LA	South	2	17	Large1	54,524	821	2,263	545	1,849
3	Chic	Solid	LA	Midwest	3	13	Large1	61,642	580	1,597	0	2,746
3	Chic	Solid	LA	South	3	19	Large1	54,044	580	1,360	0	1,849
3	Chic	Solid	LA	Midwest	1	0	Large1	68,922	15,651	5,955	28,125	2,746
3	Chic	Solid	LA	South	1	0	Large1	65,141	12,589	8,034	21,728	1,849
3	Chic	Solid	LA	Midwest	2	17	Large1	62,029	962	3,528	822	2,746
3	Chic	Solid	LA	South	2	11	Large1	54,588	892	4,278	674	1,849

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
3	Chic	Solid	LA	Midwest	3	19	Large1	61,642	580	1,597	0	2,746
3	Chic	Solid	LA	South	3	13	Large1	54,044	580	1,360	0	1,849
3	Chic	Solid	LA	Midwest	1	0	Large2	270,735	10,799	5,748	19,106	2,746
3	Chic	Solid	LA	South	1	0	Large2	165,299	6,153	5,144	10,143	1,849
3	Chic	Solid	LA	Midwest	2	3	Large2	266,224	1,187	4,408	1,239	2,746
3	Chic	Solid	LA	South	2	5	Large2	160,718	1,076	3,872	1,004	1,849
3	Chic	Solid	LA	Midwest	3	3	Large2	265,732	580	2,788	0	2,746
3	Chic	Solid	LA	South	3	6	Large2	160,008	580	2,036	0	1,849
3	Chic	Solid	LA	Midwest	1	0	Large2	297,074	66,923	21,924	123,431	2,746
3	Chic	Solid	LA	South	1	0	Large2	192,914	36,762	22,104	65,239	1,849
3	Chic	Solid	LA	Midwest	2	4	Large2	266,244	1,230	6,058	1,319	2,746
3	Chic	Solid	LA	South	2	4	Large2	160,749	1,111	6,979	1,067	1,849
3	Chic	Solid	LA	Midwest	3	4	Large2	265,732	580	2,788	0	2,746
3	Chic	Solid	LA	South	3	4	Large2	160,008	580	2,036	0	1,849
3	Chic	Solid	LA	Midwest	1	1	Medium1a	10,154	895	1,391	697	2,746
3	Chic	Solid	LA	South	1	1	Medium1a	7,652	784	1,207	478	1,849
3	Chic	Solid	LA	Midwest	2	9	Medium1a	10,073	722	1,437	376	2,746
3	Chic	Solid	LA	South	2	11	Medium1a	7,573	696	1,222	321	1,849
3	Chic	Solid	LA	Midwest	3	5	Medium1a	9,798	580	1,285	0	2,746
3	Chic	Solid	LA	South	3	6	Medium1a	7,205	580	1,074	0	1,849
3	Chic	Solid	LA	Midwest	1	2	Medium1a	10,966	2,626	1,890	3,914	2,746
3	Chic	Solid	LA	South	1	1	Medium1a	8,663	1,905	1,828	2,495	1,849
3	Chic	Solid	LA	Midwest	2	14	Medium1a	10,089	757	1,619	439	2,746
3	Chic	Solid	LA	South	2	7	Medium1a	7,598	724	1,486	371	1,849
3	Chic	Solid	LA	Midwest	3	8	Medium1a	9,798	580	1,285	0	2,746
3	Chic	Solid	LA	South	3	4	Medium1a	7,205	580	1,074	0	1,849
3	Chic	Solid	LA	Midwest	1	1	Medium1b	13,364	1,017	1,455	924	2,746
3	Chic	Solid	LA	South	1	1	Medium1b	9,971	863	1,254	621	1,849
3	Chic	Solid	LA	Midwest	2	6	Medium1b	13,226	722	1,534	376	2,746

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
3	Chic	Solid	LA	South	2	7	Medium1b	9,821	696	1,284	321	1,849
3	Chic	Solid	LA	Midwest	3	3	Medium1b	12,952	580	1,314	0	2,746
3	Chic	Solid	LA	South	3	4	Medium1b	9,453	580	1,078	0	1,849
3	Chic	Solid	LA	Midwest	1	1	Medium1b	14,491	3,418	2,147	5,387	2,746
3	Chic	Solid	LA	South	1	1	Medium1b	11,374	2,417	2,116	3,419	1,849
3	Chic	Solid	LA	Midwest	2	9	Medium1b	13,242	757	1,761	439	2,746
3	Chic	Solid	LA	South	2	5	Medium1b	9,846	724	1,625	371	1,849
3	Chic	Solid	LA	Midwest	3	5	Medium1b	12,952	580	1,314	0	2,746
3	Chic	Solid	LA	South	3	3	Medium1b	9,453	580	1,078	0	1,849
3	Chic	Solid	LA	Midwest	1	2	Medium2	23,187	1,390	1,599	1,618	2,746
3	Chic	Solid	LA	South	1	3	Medium2	19,687	1,194	1,495	1,216	1,849
3	Chic	Solid	LA	Midwest	2	16	Medium2	22,940	865	1,739	641	2,746
3	Chic	Solid	LA	South	2	24	Medium2	19,343	813	1,563	530	1,849
3	Chic	Solid	LA	Midwest	3	13	Medium2	22,599	580	1,350	0	2,746
3	Chic	Solid	LA	South	3	19	Medium2	18,871	580	1,135	0	1,849
3	Chic	Solid	LA	Midwest	1	3	Medium2	25,276	5,842	2,882	9,892	2,746
3	Chic	Solid	LA	South	1	2	Medium2	22,729	4,566	3,363	7,285	1,849
3	Chic	Solid	LA	Midwest	2	24	Medium2	22,980	949	2,172	797	2,746
3	Chic	Solid	LA	South	2	16	Medium2	19,405	881	2,296	654	1,849
3	Chic	Solid	LA	Midwest	3	19	Medium2	22,599	580	1,350	0	2,746
3	Chic	Solid	LA	South	3	13	Medium2	18,871	580	1,135	0	1,849
3	Chic	Liquid	LW	South	1	3	Large1	18,612	1,128	2,159	1,097	1,849
3	Chic	Liquid	LW	South	2	29	Large1	124,846	799	24,961	505	1,849
3	Chic	Liquid	LW	South	3	16	Large1	124,386	580	8,745	0	1,849
3	Chic	Liquid	LW	South	1	2	Large1	21,326	4,135	3,825	6,511	1,849
3	Chic	Liquid	LW	South	2	19	Large1	124,884	841	21,907	580	1,849
3	Chic	Liquid	LW	South	3	11	Large1	124,386	580	4,444	0	1,849
3	Chic	Liquid	LW	South	1	13	Medium2	3,095	603	1,144	153	1,849
3	Chic	Liquid	LW	South	2	53	Medium2	12,901	590	2,210	130	1,849

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
3	Chic	Liquid	LW	South	3	42	Medium2	12,629	580	1,509	0	1,849
3	Chic	Liquid	LW	South	1	9	Medium2	3,209	729	1,214	380	1,849
3	Chic	Liquid	LW	South	2	35	Medium2	12,939	632	2,104	205	1,849
3	Chic	Liquid	LW	South	3	28	Medium2	12,629	580	1,328	0	1,849
3.1	Chic	Solid	BR	Mid-Atlantic	1	14	Large1	64,538	2,214	2,249	2,391	3,082
3.1	Chic	Solid	BR	South	1	46	Large1	65,498	2,453	2,432	2,740	3,082
3.1	Chic	Solid	BR	Mid-Atlantic	2	209	Large1	63,405	890	2,289	536	3,082
3.1	Chic	Solid	BR	South	2	659	Large1	63,932	851	2,158	496	3,082
3.1	Chic	Solid	BR	Mid-Atlantic	3	102	Large1	62,675	580	1,355	0	3,082
3.1	Chic	Solid	BR	South	3	323	Large1	63,142	580	1,268	0	3,082
3.1	Chic	Solid	BR	Mid-Atlantic	1	21	Large1	65,240	3,036	2,680	3,541	3,082
3.1	Chic	Solid	BR	South	1	30	Large1	67,908	4,917	3,912	6,189	3,082
3.1	Chic	Solid	BR	Mid-Atlantic	2	314	Large1	63,427	916	6,327	573	3,082
3.1	Chic	Solid	BR	South	2	440	Large1	63,964	884	3,538	543	3,082
3.1	Chic	Solid	BR	Mid-Atlantic	3	153	Large1	62,675	580	1,355	0	3,082
3.1	Chic	Solid	BR	South	3	215	Large1	63,142	580	1,268	0	3,082
3.1	Chic	Solid	BR	Mid-Atlantic	1	2	Large2	168,396	4,878	4,342	6,120	3,082
3.1	Chic	Solid	BR	South	1	10	Large2	155,678	5,064	4,659	6,395	3,082
3.1	Chic	Solid	BR	Mid-Atlantic	2	40	Large2	165,119	1,047	3,439	756	3,082
3.1	Chic	Solid	BR	South	2	140	Large2	151,693	988	3,248	688	3,082
3.1	Chic	Solid	BR	Mid-Atlantic	3	16	Large2	164,255	580	2,049	0	3,082
3.1	Chic	Solid	BR	South	3	68	Large2	150,769	580	1,927	0	3,082
3.1	Chic	Solid	BR	Mid-Atlantic	1	3	Large2	170,244	7,038	5,476	9,144	3,082
3.1	Chic	Solid	BR	South	1	7	Large2	161,445	10,963	8,201	14,653	3,082
3.1	Chic	Solid	BR	Mid-Atlantic	2	60	Large2	165,162	1,097	10,330	827	3,082
3.1	Chic	Solid	BR	South	2	93	Large2	151,736	1,033	5,286	751	3,082
3.1	Chic	Solid	BR	Mid-Atlantic	3	24	Large2	164,255	580	2,049	0	3,082
3.1	Chic	Solid	BR	South	3	46	Large2	150,769	580	1,927	0	3,082
3.1	Chic	Solid	BR	Mid-Atlantic	1	33	Medium1a	21,127	1,075	1,351	791	3,082

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
3.1	Chic	Solid	BR	South	1	79	Medium1a	20,967	1,172	1,383	946	3,082
3.1	Chic	Solid	BR	Mid-Atlantic	2	275	Medium1a	20,831	747	1,362	331	3,082
3.1	Chic	Solid	BR	South	2	665	Medium1a	20,547	736	1,382	336	3,082
3.1	Chic	Solid	BR	Mid-Atlantic	3	206	Medium1a	20,239	580	1,043	0	3,082
3.1	Chic	Solid	BR	South	3	499	Medium1a	19,872	580	992	0	3,082
3.1	Chic	Solid	BR	Mid-Atlantic	1	49	Medium1a	21,351	1,324	1,488	1,139	3,082
3.1	Chic	Solid	BR	South	1	53	Medium1a	21,717	1,950	1,844	2,036	3,082
3.1	Chic	Solid	BR	Mid-Atlantic	2	413	Medium1a	20,856	774	2,481	369	3,082
3.1	Chic	Solid	BR	South	2	444	Medium1a	20,571	761	1,849	371	3,082
3.1	Chic	Solid	BR	Mid-Atlantic	3	309	Medium1a	20,239	580	1,043	0	3,082
3.1	Chic	Solid	BR	South	3	333	Medium1a	19,872	580	992	0	3,082
3.1	Chic	Solid	BR	Mid-Atlantic	1	15	Medium1b	29,305	1,274	1,539	1,069	3,082
3.1	Chic	Solid	BR	South	1	36	Medium1b	29,076	1,410	1,614	1,279	3,082
3.1	Chic	Solid	BR	Mid-Atlantic	2	126	Medium1b	28,830	747	1,559	331	3,082
3.1	Chic	Solid	BR	South	2	305	Medium1b	28,427	736	1,614	336	3,082
3.1	Chic	Solid	BR	Mid-Atlantic	3	95	Medium1b	28,237	580	1,122	0	3,082
3.1	Chic	Solid	BR	South	3	228	Medium1b	27,751	580	1,083	0	3,082
3.1	Chic	Solid	BR	Mid-Atlantic	1	23	Medium1b	29,619	1,623	1,732	1,557	3,082
3.1	Chic	Solid	BR	South	1	24	Medium1b	30,128	2,501	2,261	2,807	3,082
3.1	Chic	Solid	BR	Mid-Atlantic	2	189	Medium1b	28,854	774	3,268	369	3,082
3.1	Chic	Solid	BR	South	2	203	Medium1b	28,451	761	2,269	371	3,082
3.1	Chic	Solid	BR	Mid-Atlantic	3	142	Medium1b	28,237	580	1,122	0	3,082
3.1	Chic	Solid	BR	South	3	152	Medium1b	27,751	580	1,083	0	3,082
3.1	Chic	Solid	BR	Mid-Atlantic	1	19	Medium2	41,467	1,570	1,714	1,483	3,082
3.1	Chic	Solid	BR	South	1	57	Medium2	41,417	1,772	1,838	1,786	3,082
3.1	Chic	Solid	BR	Mid-Atlantic	2	224	Medium2	40,767	794	1,744	397	3,082
3.1	Chic	Solid	BR	South	2	683	Medium2	40,467	787	1,772	407	3,082
3.1	Chic	Solid	BR	Mid-Atlantic	3	148	Medium2	40,132	580	1,133	0	3,082
3.1	Chic	Solid	BR	South	3	450	Medium2	39,743	580	1,092	0	3,082

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
3.1	Chic	Solid	BR	Mid-Atlantic	1	28	Medium2	41,915	2,067	1,990	2,180	3,082
3.1	Chic	Solid	BR	South	1	38	Medium2	42,929	3,340	2,766	3,982	3,082
3.1	Chic	Solid	BR	Mid-Atlantic	2	336	Medium2	40,791	821	4,249	435	3,082
3.1	Chic	Solid	BR	South	2	455	Medium2	40,485	805	2,779	432	3,082
3.1	Chic	Solid	BR	Mid-Atlantic	3	222	Medium2	40,132	580	1,133	0	3,082
3.1	Chic	Solid	BR	South	3	300	Medium2	39,743	580	1,092	0	3,082
3.1	Chic	Solid	LA	Midwest	1	1	Large1	59,137	2,901	1,123	4,426	2,746
3.1	Chic	Solid	LA	South	1	2	Large1	52,774	2,430	1,457	3,441	1,849
3.1	Chic	Solid	LA	Midwest	2	30	Large1	58,186	875	1,235	660	2,746
3.1	Chic	Solid	LA	South	2	59	Large1	51,323	821	1,315	545	1,849
3.1	Chic	Solid	LA	Midwest	3	33	Large1	57,840	580	439	0	2,746
3.1	Chic	Solid	LA	South	3	67	Large1	50,843	580	412	0	1,849
3.1	Chic	Solid	LA	Midwest	1	1	Large1	65,120	15,651	4,798	28,125	2,746
3.1	Chic	Solid	LA	South	1	1	Large1	61,940	12,589	7,086	21,728	1,849
3.1	Chic	Solid	LA	Midwest	2	44	Large1	58,227	962	2,370	822	2,746
3.1	Chic	Solid	LA	South	2	39	Large1	51,387	892	3,330	674	1,849
3.1	Chic	Solid	LA	Midwest	3	50	Large1	57,840	580	439	0	2,746
3.1	Chic	Solid	LA	South	3	45	Large1	50,843	580	412	0	1,849
3.1	Chic	Solid	LA	Midwest	1	0	Large2	259,389	10,799	4,442	19,106	2,746
3.1	Chic	Solid	LA	South	1	0	Large2	158,261	6,153	4,120	10,143	1,849
3.1	Chic	Solid	LA	Midwest	2	7	Large2	254,878	1,187	3,101	1,239	2,746
3.1	Chic	Solid	LA	South	2	19	Large2	153,681	1,076	2,848	1,004	1,849
3.1	Chic	Solid	LA	Midwest	3	8	Large2	254,386	580	1,481	0	2,746
3.1	Chic	Solid	LA	South	3	21	Large2	152,971	580	1,012	0	1,849
3.1	Chic	Solid	LA	Midwest	1	0	Large2	285,727	66,923	20,617	123,431	2,746
3.1	Chic	Solid	LA	South	1	0	Large2	185,877	36,762	21,080	65,239	1,849
3.1	Chic	Solid	LA	Midwest	2	10	Large2	254,898	1,230	4,751	1,319	2,746
3.1	Chic	Solid	LA	South	2	12	Large2	153,712	1,111	5,955	1,067	1,849
3.1	Chic	Solid	LA	Midwest	3	11	Large2	254,386	580	1,481	0	2,746

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
3.1	Chic	Solid	LA	South	3	14	Large2	152,971	580	1,012	0	1,849
3.1	Chic	Solid	LA	Midwest	1	3	Medium1a	8,268	895	272	697	2,746
3.1	Chic	Solid	LA	South	1	4	Medium1a	6,146	784	292	478	1,849
3.1	Chic	Solid	LA	Midwest	2	24	Medium1a	8,187	722	317	376	2,746
3.1	Chic	Solid	LA	South	2	36	Medium1a	6,067	696	307	321	1,849
3.1	Chic	Solid	LA	Midwest	3	13	Medium1a	7,913	580	166	0	2,746
3.1	Chic	Solid	LA	South	3	20	Medium1a	5,700	580	159	0	1,849
3.1	Chic	Solid	LA	Midwest	1	4	Medium1a	9,081	2,626	771	3,914	2,746
3.1	Chic	Solid	LA	South	1	3	Medium1a	7,157	1,905	913	2,495	1,849
3.1	Chic	Solid	LA	Midwest	2	37	Medium1a	8,203	757	499	439	2,746
3.1	Chic	Solid	LA	South	2	24	Medium1a	6,092	724	571	371	1,849
3.1	Chic	Solid	LA	Midwest	3	20	Medium1a	7,913	580	166	0	2,746
3.1	Chic	Solid	LA	South	3	13	Medium1a	5,700	580	159	0	1,849
3.1	Chic	Solid	LA	Midwest	1	2	Medium1b	11,362	1,017	333	924	2,746
3.1	Chic	Solid	LA	South	1	3	Medium1b	8,384	863	338	621	1,849
3.1	Chic	Solid	LA	Midwest	2	16	Medium1b	11,224	722	412	376	2,746
3.1	Chic	Solid	LA	South	2	24	Medium1b	8,234	696	368	321	1,849
3.1	Chic	Solid	LA	Midwest	3	9	Medium1b	10,950	580	192	0	2,746
3.1	Chic	Solid	LA	South	3	13	Medium1b	7,867	580	161	0	1,849
3.1	Chic	Solid	LA	Midwest	1	3	Medium1b	12,489	3,418	1,025	5,387	2,746
3.1	Chic	Solid	LA	South	1	2	Medium1b	9,787	2,417	1,199	3,419	1,849
3.1	Chic	Solid	LA	Midwest	2	24	Medium1b	11,240	757	639	439	2,746
3.1	Chic	Solid	LA	South	2	16	Medium1b	8,259	724	709	371	1,849
3.1	Chic	Solid	LA	Midwest	3	13	Medium1b	10,950	580	192	0	2,746
3.1	Chic	Solid	LA	South	3	9	Medium1b	7,867	580	161	0	1,849
3.1	Chic	Solid	LA	Midwest	1	5	Medium2	20,828	1,390	470	1,618	2,746
3.1	Chic	Solid	LA	South	1	9	Medium2	17,759	1,194	572	1,216	1,849
3.1	Chic	Solid	LA	Midwest	2	42	Medium2	20,582	865	610	641	2,746
3.1	Chic	Solid	LA	South	2	82	Medium2	17,415	813	640	530	1,849

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
3.1	Chic	Solid	LA	Midwest	3	34	Medium2	20,240	580	221	0	2,746
3.1	Chic	Solid	LA	South	3	66	Medium2	16,943	580	212	0	1,849
3.1	Chic	Solid	LA	Midwest	1	8	Medium2	22,917	5,842	1,753	9,892	2,746
3.1	Chic	Solid	LA	South	1	6	Medium2	20,801	4,566	2,440	7,285	1,849
3.1	Chic	Solid	LA	Midwest	2	64	Medium2	20,621	949	1,043	797	2,746
3.1	Chic	Solid	LA	South	2	55	Medium2	17,477	881	1,373	654	1,849
3.1	Chic	Solid	LA	Midwest	3	51	Medium2	20,240	580	221	0	2,746
3.1	Chic	Solid	LA	South	3	44	Medium2	16,943	580	212	0	1,849
3.1	Chic	Liquid	LW	South	1	11	Large1	1,053	1,128	460	1,097	1,849
3.1	Chic	Liquid	LW	South	2	101	Large1	107,287	799	23,262	505	1,849
3.1	Chic	Liquid	LW	South	3	55	Large1	106,827	580	7,046	0	1,849
3.1	Chic	Liquid	LW	South	1	7	Large1	3,767	4,135	2,126	6,511	1,849
3.1	Chic	Liquid	LW	South	2	67	Large1	107,325	841	20,209	580	1,849
3.1	Chic	Liquid	LW	South	3	37	Large1	106,827	580	2,745	0	1,849
3.1	Chic	Liquid	LW	South	1	45	Medium2	415	603	166	153	1,849
3.1	Chic	Liquid	LW	South	2	183	Medium2	10,221	590	1,232	130	1,849
3.1	Chic	Liquid	LW	South	3	144	Medium2	9,949	580	530	0	1,849
3.1	Chic	Liquid	LW	South	1	30	Medium2	529	729	236	380	1,849
3.1	Chic	Liquid	LW	South	2	122	Medium2	10,259	632	1,126	205	1,849
3.1	Chic	Liquid	LW	South	3	96	Medium2	9,949	580	350	0	1,849
4	Chic	Solid	BR	Mid-Atlantic	1	4	Large1	69,049	2,606	9,533	2,391	3,082
4	Chic	Solid	BR	South	1	13	Large1	69,793	2,845	9,654	2,740	3,082
4	Chic	Solid	BR	Mid-Atlantic	2	66	Large1	67,916	1,282	9,573	536	3,082
4	Chic	Solid	BR	South	2	191	Large1	68,226	1,243	9,380	496	3,082
4	Chic	Solid	BR	Mid-Atlantic	3	32	Large1	67,187	972	8,639	0	3,082
4	Chic	Solid	BR	South	3	93	Large1	67,437	972	8,490	0	3,082
4	Chic	Solid	BR	Mid-Atlantic	1	7	Large1	69,752	3,428	9,964	3,541	3,082
4	Chic	Solid	BR	South	1	9	Large1	72,202	5,309	11,134	6,189	3,082
4	Chic	Solid	BR	Mid-Atlantic	2	99	Large1	67,938	1,308	13,611	573	3,082

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
4	Chic	Solid	BR	South	2	127	Large1	68,259	1,276	10,760	543	3,082
4	Chic	Solid	BR	Mid-Atlantic	3	48	Large1	67,187	972	8,639	0	3,082
4	Chic	Solid	BR	South	3	62	Large1	67,437	972	8,490	0	3,082
4	Chic	Solid	BR	Mid-Atlantic	1	1	Large2	178,012	5,270	11,727	6,120	3,082
4	Chic	Solid	BR	South	1	3	Large2	164,153	5,456	11,964	6,395	3,082
4	Chic	Solid	BR	Mid-Atlantic	2	13	Large2	174,735	1,439	10,824	756	3,082
4	Chic	Solid	BR	South	2	41	Large2	160,168	1,380	10,553	688	3,082
4	Chic	Solid	BR	Mid-Atlantic	3	5	Large2	173,871	972	9,434	0	3,082
4	Chic	Solid	BR	South	3	20	Large2	159,244	972	9,232	0	3,082
4	Chic	Solid	BR	Mid-Atlantic	1	1	Large2	179,859	7,430	12,861	9,144	3,082
4	Chic	Solid	BR	South	1	2	Large2	169,920	11,355	15,506	14,653	3,082
4	Chic	Solid	BR	Mid-Atlantic	2	19	Large2	174,778	1,489	17,715	827	3,082
4	Chic	Solid	BR	South	2	27	Large2	160,211	1,425	12,590	751	3,082
4	Chic	Solid	BR	Mid-Atlantic	3	8	Large2	173,871	972	9,434	0	3,082
4	Chic	Solid	BR	South	3	13	Large2	159,244	972	9,232	0	3,082
4	Chic	Solid	BR	Mid-Atlantic	1	10	Medium1a	23,506	1,467	8,592	791	3,082
4	Chic	Solid	BR	South	1	23	Medium1a	23,197	1,564	8,564	946	3,082
4	Chic	Solid	BR	Mid-Atlantic	2	86	Medium1a	23,210	1,139	8,604	331	3,082
4	Chic	Solid	BR	South	2	193	Medium1a	22,777	1,128	8,563	336	3,082
4	Chic	Solid	BR	Mid-Atlantic	3	65	Medium1a	22,618	972	8,285	0	3,082
4	Chic	Solid	BR	South	3	144	Medium1a	22,101	972	8,173	0	3,082
4	Chic	Solid	BR	Mid-Atlantic	1	15	Medium1a	23,730	1,716	8,730	1,139	3,082
4	Chic	Solid	BR	South	1	15	Medium1a	23,947	2,342	9,024	2,036	3,082
4	Chic	Solid	BR	Mid-Atlantic	2	130	Medium1a	23,235	1,166	9,722	369	3,082
4	Chic	Solid	BR	South	2	128	Medium1a	22,801	1,153	9,030	371	3,082
4	Chic	Solid	BR	Mid-Atlantic	3	97	Medium1a	22,618	972	8,285	0	3,082
4	Chic	Solid	BR	South	3	96	Medium1a	22,101	972	8,173	0	3,082
4	Chic	Solid	BR	Mid-Atlantic	1	5	Medium1b	32,086	1,666	8,789	1,069	3,082
4	Chic	Solid	BR	South	1	11	Medium1b	31,682	1,802	8,803	1,279	3,082

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
4	Chic	Solid	BR	Mid-Atlantic	2	40	Medium1b	31,611	1,139	8,808	331	3,082
4	Chic	Solid	BR	South	2	88	Medium1b	31,032	1,128	8,802	336	3,082
4	Chic	Solid	BR	Mid-Atlantic	3	30	Medium1b	31,019	972	8,371	0	3,082
4	Chic	Solid	BR	South	3	66	Medium1b	30,357	972	8,272	0	3,082
4	Chic	Solid	BR	Mid-Atlantic	1	7	Medium1b	32,400	2,015	8,982	1,557	3,082
4	Chic	Solid	BR	South	1	7	Medium1b	32,734	2,893	9,449	2,807	3,082
4	Chic	Solid	BR	Mid-Atlantic	2	60	Medium1b	31,636	1,166	10,518	369	3,082
4	Chic	Solid	BR	South	2	59	Medium1b	31,057	1,153	9,458	371	3,082
4	Chic	Solid	BR	Mid-Atlantic	3	45	Medium1b	31,019	972	8,371	0	3,082
4	Chic	Solid	BR	South	3	44	Medium1b	30,357	972	8,272	0	3,082
4	Chic	Solid	BR	Mid-Atlantic	1	6	Medium2	44,846	1,962	8,976	1,483	3,082
4	Chic	Solid	BR	South	1	16	Medium2	44,594	2,164	9,038	1,786	3,082
4	Chic	Solid	BR	Mid-Atlantic	2	70	Medium2	44,146	1,186	9,005	397	3,082
4	Chic	Solid	BR	South	2	198	Medium2	43,645	1,179	8,972	407	3,082
4	Chic	Solid	BR	Mid-Atlantic	3	46	Medium2	43,511	972	8,394	0	3,082
4	Chic	Solid	BR	South	3	130	Medium2	42,920	972	8,292	0	3,082
4	Chic	Solid	BR	Mid-Atlantic	1	9	Medium2	45,294	2,459	9,251	2,180	3,082
4	Chic	Solid	BR	South	1	11	Medium2	46,106	3,732	9,966	3,982	3,082
4	Chic	Solid	BR	Mid-Atlantic	2	106	Medium2	44,170	1,213	11,510	435	3,082
4	Chic	Solid	BR	South	2	132	Medium2	43,662	1,197	9,978	432	3,082
4	Chic	Solid	BR	Mid-Atlantic	3	70	Medium2	43,511	972	8,394	0	3,082
4	Chic	Solid	BR	South	3	87	Medium2	42,920	972	8,292	0	3,082
4	Chic	Solid	LA	Midwest	1	0	Large1	62,939	3,293	8,533	4,426	2,746
4	Chic	Solid	LA	South	1	1	Large1	55,975	2,822	8,657	3,441	1,849
4	Chic	Solid	LA	Midwest	2	11	Large1	61,988	1,267	8,645	660	2,746
4	Chic	Solid	LA	South	2	17	Large1	54,524	1,213	8,515	545	1,849
4	Chic	Solid	LA	Midwest	3	13	Large1	61,642	972	7,849	0	2,746
4	Chic	Solid	LA	South	3	19	Large1	54,044	972	7,612	0	1,849
4	Chic	Solid	LA	Midwest	1	0	Large1	68,922	16,043	12,207	28,125	2,746

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
4	Chic	Solid	LA	South	1	0	Large1	65,141	12,981	14,286	21,728	1,849
4	Chic	Solid	LA	Midwest	2	17	Large1	62,029	1,354	9,780	822	2,746
4	Chic	Solid	LA	South	2	11	Large1	54,588	1,284	10,530	674	1,849
4	Chic	Solid	LA	Midwest	3	19	Large1	61,642	972	7,849	0	2,746
4	Chic	Solid	LA	South	3	13	Large1	54,044	972	7,612	0	1,849
4	Chic	Solid	LA	Midwest	1	0	Large2	270,735	11,191	12,000	19,106	2,746
4	Chic	Solid	LA	South	1	0	Large2	165,299	6,545	11,396	10,143	1,849
4	Chic	Solid	LA	Midwest	2	3	Large2	266,224	1,579	10,660	1,239	2,746
4	Chic	Solid	LA	South	2	5	Large2	160,718	1,468	10,124	1,004	1,849
4	Chic	Solid	LA	Midwest	3	3	Large2	265,732	972	9,040	0	2,746
4	Chic	Solid	LA	South	3	6	Large2	160,008	972	8,288	0	1,849
4	Chic	Solid	LA	Midwest	1	0	Large2	297,074	67,315	28,176	123,431	2,746
4	Chic	Solid	LA	South	1	0	Large2	192,914	37,154	28,356	65,239	1,849
4	Chic	Solid	LA	Midwest	2	4	Large2	266,244	1,622	12,310	1,319	2,746
4	Chic	Solid	LA	South	2	4	Large2	160,749	1,503	13,231	1,067	1,849
4	Chic	Solid	LA	Midwest	3	4	Large2	265,732	972	9,040	0	2,746
4	Chic	Solid	LA	South	3	4	Large2	160,008	972	8,288	0	1,849
4	Chic	Solid	LA	Midwest	1	1	Medium1a	10,154	1,287	7,643	697	2,746
4	Chic	Solid	LA	South	1	1	Medium1a	7,652	1,176	7,459	478	1,849
4	Chic	Solid	LA	Midwest	2	9	Medium1a	10,073	1,114	7,689	376	2,746
4	Chic	Solid	LA	South	2	11	Medium1a	7,573	1,088	7,474	321	1,849
4	Chic	Solid	LA	Midwest	3	5	Medium1a	9,798	972	7,537	0	2,746
4	Chic	Solid	LA	South	3	6	Medium1a	7,205	972	7,326	0	1,849
4	Chic	Solid	LA	Midwest	1	2	Medium1a	10,966	3,018	8,142	3,914	2,746
4	Chic	Solid	LA	South	1	1	Medium1a	8,663	2,297	8,080	2,495	1,849
4	Chic	Solid	LA	Midwest	2	14	Medium1a	10,089	1,149	7,871	439	2,746
4	Chic	Solid	LA	South	2	7	Medium1a	7,598	1,116	7,738	371	1,849
4	Chic	Solid	LA	Midwest	3	8	Medium1a	9,798	972	7,537	0	2,746
4	Chic	Solid	LA	South	3	4	Medium1a	7,205	972	7,326	0	1,849

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
4	Chic	Solid	LA	Midwest	1	1	Medium1b	13,364	1,409	7,707	924	2,746
4	Chic	Solid	LA	South	1	1	Medium1b	9,971	1,255	7,506	621	1,849
4	Chic	Solid	LA	Midwest	2	6	Medium1b	13,226	1,114	7,786	376	2,746
4	Chic	Solid	LA	South	2	7	Medium1b	9,821	1,088	7,536	321	1,849
4	Chic	Solid	LA	Midwest	3	3	Medium1b	12,952	972	7,566	0	2,746
4	Chic	Solid	LA	South	3	4	Medium1b	9,453	972	7,330	0	1,849
4	Chic	Solid	LA	Midwest	1	1	Medium1b	14,491	3,810	8,399	5,387	2,746
4	Chic	Solid	LA	South	1	1	Medium1b	11,374	2,809	8,368	3,419	1,849
4	Chic	Solid	LA	Midwest	2	9	Medium1b	13,242	1,149	8,013	439	2,746
4	Chic	Solid	LA	South	2	5	Medium1b	9,846	1,116	7,877	371	1,849
4	Chic	Solid	LA	Midwest	3	5	Medium1b	12,952	972	7,566	0	2,746
4	Chic	Solid	LA	South	3	3	Medium1b	9,453	972	7,330	0	1,849
4	Chic	Solid	LA	Midwest	1	2	Medium2	23,187	1,782	7,851	1,618	2,746
4	Chic	Solid	LA	South	1	3	Medium2	19,687	1,586	7,747	1,216	1,849
4	Chic	Solid	LA	Midwest	2	16	Medium2	22,940	1,257	7,991	641	2,746
4	Chic	Solid	LA	South	2	24	Medium2	19,343	1,205	7,815	530	1,849
4	Chic	Solid	LA	Midwest	3	13	Medium2	22,599	972	7,602	0	2,746
4	Chic	Solid	LA	South	3	19	Medium2	18,871	972	7,387	0	1,849
4	Chic	Solid	LA	Midwest	1	3	Medium2	25,276	6,234	9,134	9,892	2,746
4	Chic	Solid	LA	South	1	2	Medium2	22,729	4,958	9,615	7,285	1,849
4	Chic	Solid	LA	Midwest	2	24	Medium2	22,980	1,341	8,424	797	2,746
4	Chic	Solid	LA	South	2	16	Medium2	19,405	1,273	8,548	654	1,849
4	Chic	Solid	LA	Midwest	3	19	Medium2	22,599	972	7,602	0	2,746
4	Chic	Solid	LA	South	3	13	Medium2	18,871	972	7,387	0	1,849
4	Chic	Liquid	LW	South	1	3	Large1	18,612	1,520	8,411	1,097	1,849
4	Chic	Liquid	LW	South	2	29	Large1	124,846	1,191	31,213	505	1,849
4	Chic	Liquid	LW	South	3	16	Large1	124,386	972	14,997	0	1,849
4	Chic	Liquid	LW	South	1	2	Large1	21,326	4,527	10,077	6,511	1,849
4	Chic	Liquid	LW	South	2	19	Large1	124,884	1,233	28,159	580	1,849

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
4	Chic	Liquid	LW	South	3	11	Large1	124,386	972	10,696	0	1,849
4	Chic	Liquid	LW	South	1	13	Medium2	3,095	995	7,396	153	1,849
4	Chic	Liquid	LW	South	2	53	Medium2	12,901	982	8,462	130	1,849
4	Chic	Liquid	LW	South	3	42	Medium2	12,629	972	7,761	0	1,849
4	Chic	Liquid	LW	South	1	9	Medium2	3,209	1,121	7,466	380	1,849
4	Chic	Liquid	LW	South	2	35	Medium2	12,939	1,024	8,356	205	1,849
4	Chic	Liquid	LW	South	3	28	Medium2	12,629	972	7,580	0	1,849
4.1	Chic	Solid	BR	Mid-Atlantic	1	14	Large1	64,538	2,606	8,501	2,391	3,082
4.1	Chic	Solid	BR	South	1	46	Large1	65,498	2,845	8,684	2,740	3,082
4.1	Chic	Solid	BR	Mid-Atlantic	2	209	Large1	63,405	1,282	8,541	536	3,082
4.1	Chic	Solid	BR	South	2	659	Large1	63,932	1,243	8,410	496	3,082
4.1	Chic	Solid	BR	Mid-Atlantic	3	102	Large1	62,675	972	7,607	0	3,082
4.1	Chic	Solid	BR	South	3	323	Large1	63,142	972	7,520	0	3,082
4.1	Chic	Solid	BR	Mid-Atlantic	1	21	Large1	65,240	3,428	8,932	3,541	3,082
4.1	Chic	Solid	BR	South	1	30	Large1	67,908	5,309	10,164	6,189	3,082
4.1	Chic	Solid	BR	Mid-Atlantic	2	314	Large1	63,427	1,308	12,579	573	3,082
4.1	Chic	Solid	BR	South	2	440	Large1	63,964	1,276	9,790	543	3,082
4.1	Chic	Solid	BR	Mid-Atlantic	3	153	Large1	62,675	972	7,607	0	3,082
4.1	Chic	Solid	BR	South	3	215	Large1	63,142	972	7,520	0	3,082
4.1	Chic	Solid	BR	Mid-Atlantic	1	2	Large2	168,396	5,270	10,594	6,120	3,082
4.1	Chic	Solid	BR	South	1	10	Large2	155,678	5,456	10,911	6,395	3,082
4.1	Chic	Solid	BR	Mid-Atlantic	2	40	Large2	165,119	1,439	9,691	756	3,082
4.1	Chic	Solid	BR	South	2	140	Large2	151,693	1,380	9,500	688	3,082
4.1	Chic	Solid	BR	Mid-Atlantic	3	16	Large2	164,255	972	8,301	0	3,082
4.1	Chic	Solid	BR	South	3	68	Large2	150,769	972	8,179	0	3,082
4.1	Chic	Solid	BR	Mid-Atlantic	1	3	Large2	170,244	7,430	11,728	9,144	3,082
4.1	Chic	Solid	BR	South	1	7	Large2	161,445	11,355	14,453	14,653	3,082
4.1	Chic	Solid	BR	Mid-Atlantic	2	60	Large2	165,162	1,489	16,582	827	3,082
4.1	Chic	Solid	BR	South	2	93	Large2	151,736	1,425	11,538	751	3,082

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
4.1	Chic	Solid	BR	Mid-Atlantic	3	24	Large2	164,255	972	8,301	0	3,082
4.1	Chic	Solid	BR	South	3	46	Large2	150,769	972	8,179	0	3,082
4.1	Chic	Solid	BR	Mid-Atlantic	1	33	Medium1a	21,127	1,467	7,603	791	3,082
4.1	Chic	Solid	BR	South	1	79	Medium1a	20,967	1,564	7,635	946	3,082
4.1	Chic	Solid	BR	Mid-Atlantic	2	275	Medium1a	20,831	1,139	7,614	331	3,082
4.1	Chic	Solid	BR	South	2	665	Medium1a	20,547	1,128	7,634	336	3,082
4.1	Chic	Solid	BR	Mid-Atlantic	3	206	Medium1a	20,239	972	7,295	0	3,082
4.1	Chic	Solid	BR	South	3	499	Medium1a	19,872	972	7,244	0	3,082
4.1	Chic	Solid	BR	Mid-Atlantic	1	49	Medium1a	21,351	1,716	7,740	1,139	3,082
4.1	Chic	Solid	BR	South	1	53	Medium1a	21,717	2,342	8,096	2,036	3,082
4.1	Chic	Solid	BR	Mid-Atlantic	2	413	Medium1a	20,856	1,166	8,733	369	3,082
4.1	Chic	Solid	BR	South	2	444	Medium1a	20,571	1,153	8,101	371	3,082
4.1	Chic	Solid	BR	Mid-Atlantic	3	309	Medium1a	20,239	972	7,295	0	3,082
4.1	Chic	Solid	BR	South	3	333	Medium1a	19,872	972	7,244	0	3,082
4.1	Chic	Solid	BR	Mid-Atlantic	1	15	Medium1b	29,305	1,666	7,791	1,069	3,082
4.1	Chic	Solid	BR	South	1	36	Medium1b	29,076	1,802	7,866	1,279	3,082
4.1	Chic	Solid	BR	Mid-Atlantic	2	126	Medium1b	28,830	1,139	7,811	331	3,082
4.1	Chic	Solid	BR	South	2	305	Medium1b	28,427	1,128	7,866	336	3,082
4.1	Chic	Solid	BR	Mid-Atlantic	3	95	Medium1b	28,237	972	7,374	0	3,082
4.1	Chic	Solid	BR	South	3	228	Medium1b	27,751	972	7,335	0	3,082
4.1	Chic	Solid	BR	Mid-Atlantic	1	23	Medium1b	29,619	2,015	7,984	1,557	3,082
4.1	Chic	Solid	BR	South	1	24	Medium1b	30,128	2,893	8,513	2,807	3,082
4.1	Chic	Solid	BR	Mid-Atlantic	2	189	Medium1b	28,854	1,166	9,520	369	3,082
4.1	Chic	Solid	BR	South	2	203	Medium1b	28,451	1,153	8,521	371	3,082
4.1	Chic	Solid	BR	Mid-Atlantic	3	142	Medium1b	28,237	972	7,374	0	3,082
4.1	Chic	Solid	BR	South	3	152	Medium1b	27,751	972	7,335	0	3,082
4.1	Chic	Solid	BR	Mid-Atlantic	1	19	Medium2	41,467	1,962	7,966	1,483	3,082
4.1	Chic	Solid	BR	South	1	57	Medium2	41,417	2,164	8,090	1,786	3,082
4.1	Chic	Solid	BR	Mid-Atlantic	2	224	Medium2	40,767	1,186	7,996	397	3,082

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
4.1	Chic	Solid	BR	South	2	683	Medium2	40,467	1,179	8,024	407	3,082
4.1	Chic	Solid	BR	Mid-Atlantic	3	148	Medium2	40,132	972	7,385	0	3,082
4.1	Chic	Solid	BR	South	3	450	Medium2	39,743	972	7,344	0	3,082
4.1	Chic	Solid	BR	Mid-Atlantic	1	28	Medium2	41,915	2,459	8,242	2,180	3,082
4.1	Chic	Solid	BR	South	1	38	Medium2	42,929	3,732	9,018	3,982	3,082
4.1	Chic	Solid	BR	Mid-Atlantic	2	336	Medium2	40,791	1,213	10,501	435	3,082
4.1	Chic	Solid	BR	South	2	455	Medium2	40,485	1,197	9,031	432	3,082
4.1	Chic	Solid	BR	Mid-Atlantic	3	222	Medium2	40,132	972	7,385	0	3,082
4.1	Chic	Solid	BR	South	3	300	Medium2	39,743	972	7,344	0	3,082
4.1	Chic	Solid	LA	Midwest	1	1	Large1	59,137	3,293	7,375	4,426	2,746
4.1	Chic	Solid	LA	South	1	2	Large1	52,774	2,822	7,709	3,441	1,849
4.1	Chic	Solid	LA	Midwest	2	30	Large1	58,186	1,267	7,487	660	2,746
4.1	Chic	Solid	LA	South	2	59	Large1	51,323	1,213	7,567	545	1,849
4.1	Chic	Solid	LA	Midwest	3	33	Large1	57,840	972	6,691	0	2,746
4.1	Chic	Solid	LA	South	3	67	Large1	50,843	972	6,664	0	1,849
4.1	Chic	Solid	LA	Midwest	1	1	Large1	65,120	16,043	11,050	28,125	2,746
4.1	Chic	Solid	LA	South	1	1	Large1	61,940	12,981	13,338	21,728	1,849
4.1	Chic	Solid	LA	Midwest	2	44	Large1	58,227	1,354	8,622	822	2,746
4.1	Chic	Solid	LA	South	2	39	Large1	51,387	1,284	9,582	674	1,849
4.1	Chic	Solid	LA	Midwest	3	50	Large1	57,840	972	6,691	0	2,746
4.1	Chic	Solid	LA	South	3	45	Large1	50,843	972	6,664	0	1,849
4.1	Chic	Solid	LA	Midwest	1	0	Large2	259,389	11,191	10,694	19,106	2,746
4.1	Chic	Solid	LA	South	1	0	Large2	158,261	6,545	10,372	10,143	1,849
4.1	Chic	Solid	LA	Midwest	2	7	Large2	254,878	1,579	9,353	1,239	2,746
4.1	Chic	Solid	LA	South	2	19	Large2	153,681	1,468	9,100	1,004	1,849
4.1	Chic	Solid	LA	Midwest	3	8	Large2	254,386	972	7,733	0	2,746
4.1	Chic	Solid	LA	South	3	21	Large2	152,971	972	7,264	0	1,849
4.1	Chic	Solid	LA	Midwest	1	0	Large2	285,727	67,315	26,869	123,431	2,746
4.1	Chic	Solid	LA	South	1	0	Large2	185,877	37,154	27,332	65,239	1,849

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
4.1	Chic	Solid	LA	Midwest	2	10	Large2	254,898	1,622	11,003	1,319	2,746
4.1	Chic	Solid	LA	South	2	12	Large2	153,712	1,503	12,207	1,067	1,849
4.1	Chic	Solid	LA	Midwest	3	11	Large2	254,386	972	7,733	0	2,746
4.1	Chic	Solid	LA	South	3	14	Large2	152,971	972	7,264	0	1,849
4.1	Chic	Solid	LA	Midwest	1	3	Medium1a	8,268	1,287	6,524	697	2,746
4.1	Chic	Solid	LA	South	1	4	Medium1a	6,146	1,176	6,544	478	1,849
4.1	Chic	Solid	LA	Midwest	2	24	Medium1a	8,187	1,114	6,569	376	2,746
4.1	Chic	Solid	LA	South	2	36	Medium1a	6,067	1,088	6,559	321	1,849
4.1	Chic	Solid	LA	Midwest	3	13	Medium1a	7,913	972	6,418	0	2,746
4.1	Chic	Solid	LA	South	3	20	Medium1a	5,700	972	6,411	0	1,849
4.1	Chic	Solid	LA	Midwest	1	4	Medium1a	9,081	3,018	7,023	3,914	2,746
4.1	Chic	Solid	LA	South	1	3	Medium1a	7,157	2,297	7,165	2,495	1,849
4.1	Chic	Solid	LA	Midwest	2	37	Medium1a	8,203	1,149	6,751	439	2,746
4.1	Chic	Solid	LA	South	2	24	Medium1a	6,092	1,116	6,823	371	1,849
4.1	Chic	Solid	LA	Midwest	3	20	Medium1a	7,913	972	6,418	0	2,746
4.1	Chic	Solid	LA	South	3	13	Medium1a	5,700	972	6,411	0	1,849
4.1	Chic	Solid	LA	Midwest	1	2	Medium1b	11,362	1,409	6,585	924	2,746
4.1	Chic	Solid	LA	South	1	3	Medium1b	8,384	1,255	6,590	621	1,849
4.1	Chic	Solid	LA	Midwest	2	16	Medium1b	11,224	1,114	6,664	376	2,746
4.1	Chic	Solid	LA	South	2	24	Medium1b	8,234	1,088	6,620	321	1,849
4.1	Chic	Solid	LA	Midwest	3	9	Medium1b	10,950	972	6,444	0	2,746
4.1	Chic	Solid	LA	South	3	13	Medium1b	7,867	972	6,413	0	1,849
4.1	Chic	Solid	LA	Midwest	1	3	Medium1b	12,489	3,810	7,277	5,387	2,746
4.1	Chic	Solid	LA	South	1	2	Medium1b	9,787	2,809	7,451	3,419	1,849
4.1	Chic	Solid	LA	Midwest	2	24	Medium1b	11,240	1,149	6,891	439	2,746
4.1	Chic	Solid	LA	South	2	16	Medium1b	8,259	1,116	6,961	371	1,849
4.1	Chic	Solid	LA	Midwest	3	13	Medium1b	10,950	972	6,444	0	2,746
4.1	Chic	Solid	LA	South	3	9	Medium1b	7,867	972	6,413	0	1,849
4.1	Chic	Solid	LA	Midwest	1	5	Medium2	20,828	1,782	6,722	1,618	2,746

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
4.1	Chic	Solid	LA	South	1	9	Medium2	17,759	1,586	6,824	1,216	1,849
4.1	Chic	Solid	LA	Midwest	2	42	Medium2	20,582	1,257	6,862	641	2,746
4.1	Chic	Solid	LA	South	2	82	Medium2	17,415	1,205	6,892	530	1,849
4.1	Chic	Solid	LA	Midwest	3	34	Medium2	20,240	972	6,473	0	2,746
4.1	Chic	Solid	LA	South	3	66	Medium2	16,943	972	6,464	0	1,849
4.1	Chic	Solid	LA	Midwest	1	8	Medium2	22,917	6,234	8,005	9,892	2,746
4.1	Chic	Solid	LA	South	1	6	Medium2	20,801	4,958	8,692	7,285	1,849
4.1	Chic	Solid	LA	Midwest	2	64	Medium2	20,621	1,341	7,295	797	2,746
4.1	Chic	Solid	LA	South	2	55	Medium2	17,477	1,273	7,625	654	1,849
4.1	Chic	Solid	LA	Midwest	3	51	Medium2	20,240	972	6,473	0	2,746
4.1	Chic	Solid	LA	South	3	44	Medium2	16,943	972	6,464	0	1,849
4.1	Chic	Liquid	LW	South	1	11	Large1	1,053	1,520	6,712	1,097	1,849
4.1	Chic	Liquid	LW	South	2	101	Large1	107,287	1,191	29,514	505	1,849
4.1	Chic	Liquid	LW	South	3	55	Large1	106,827	972	13,298	0	1,849
4.1	Chic	Liquid	LW	South	1	7	Large1	3,767	4,527	8,378	6,511	1,849
4.1	Chic	Liquid	LW	South	2	67	Large1	107,325	1,233	26,461	580	1,849
4.1	Chic	Liquid	LW	South	3	37	Large1	106,827	972	8,997	0	1,849
4.1	Chic	Liquid	LW	South	1	45	Medium2	415	995	6,418	153	1,849
4.1	Chic	Liquid	LW	South	2	183	Medium2	10,221	982	7,484	130	1,849
4.1	Chic	Liquid	LW	South	3	144	Medium2	9,949	972	6,782	0	1,849
4.1	Chic	Liquid	LW	South	1	30	Medium2	529	1,121	6,488	380	1,849
4.1	Chic	Liquid	LW	South	2	122	Medium2	10,259	1,024	7,378	205	1,849
4.1	Chic	Liquid	LW	South	3	96	Medium2	9,949	972	6,602	0	1,849
5	Chic	Solid	BR	Mid-Atlantic	1	19	Large1	64,538	2,214	2,249	2,391	0
5	Chic	Solid	BR	South	1	59	Large1	65,498	2,453	2,432	2,740	0
5	Chic	Solid	BR	Mid-Atlantic	2	275	Large1	63,405	890	2,289	536	0
5	Chic	Solid	BR	South	2	850	Large1	63,932	851	2,158	496	0
5	Chic	Solid	BR	Mid-Atlantic	3	134	Large1	62,675	580	1,355	0	0
5	Chic	Solid	BR	South	3	416	Large1	63,142	580	1,268	0	0

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
5	Chic	Solid	BR	Mid-Atlantic	1	28	Large1	65,240	3,036	2,680	3,541	0
5	Chic	Solid	BR	South	1	39	Large1	67,908	4,917	3,912	6,189	0
5	Chic	Solid	BR	Mid-Atlantic	2	412	Large1	63,427	916	6,327	573	0
5	Chic	Solid	BR	South	2	567	Large1	63,964	884	3,538	543	0
5	Chic	Solid	BR	Mid-Atlantic	3	202	Large1	62,675	580	1,355	0	0
5	Chic	Solid	BR	South	3	278	Large1	63,142	580	1,268	0	0
5	Chic	Solid	BR	Mid-Atlantic	1	3	Large2	168,396	4,878	4,342	6,120	0
5	Chic	Solid	BR	South	1	13	Large2	155,678	5,064	4,659	6,395	0
5	Chic	Solid	BR	Mid-Atlantic	2	53	Large2	165,119	1,047	3,439	756	0
5	Chic	Solid	BR	South	2	181	Large2	151,693	988	3,248	688	0
5	Chic	Solid	BR	Mid-Atlantic	3	21	Large2	164,255	580	2,049	0	0
5	Chic	Solid	BR	South	3	88	Large2	150,769	580	1,927	0	0
5	Chic	Solid	BR	Mid-Atlantic	1	4	Large2	170,244	7,038	5,476	9,144	0
5	Chic	Solid	BR	South	1	8	Large2	161,445	10,963	8,201	14,653	0
5	Chic	Solid	BR	Mid-Atlantic	2	79	Large2	165,162	1,097	10,330	827	0
5	Chic	Solid	BR	South	2	120	Large2	151,736	1,033	5,286	751	0
5	Chic	Solid	BR	Mid-Atlantic	3	32	Large2	164,255	580	2,049	0	0
5	Chic	Solid	BR	South	3	59	Large2	150,769	580	1,927	0	0
5	Chic	Solid	BR	Mid-Atlantic	1	43	Medium1a	21,127	1,075	1,351	791	0
5	Chic	Solid	BR	South	1	102	Medium1a	20,967	1,172	1,383	946	0
5	Chic	Solid	BR	Mid-Atlantic	2	362	Medium1a	20,831	747	1,362	331	0
5	Chic	Solid	BR	South	2	858	Medium1a	20,547	736	1,382	336	0
5	Chic	Solid	BR	Mid-Atlantic	3	271	Medium1a	20,239	580	1,043	0	0
5	Chic	Solid	BR	South	3	643	Medium1a	19,872	580	992	0	0
5	Chic	Solid	BR	Mid-Atlantic	1	65	Medium1a	21,351	1,324	1,488	1,139	0
5	Chic	Solid	BR	South	1	68	Medium1a	21,717	1,950	1,844	2,036	0
5	Chic	Solid	BR	Mid-Atlantic	2	542	Medium1a	20,856	774	2,481	369	0
5	Chic	Solid	BR	South	2	572	Medium1a	20,571	761	1,849	371	0
5	Chic	Solid	BR	Mid-Atlantic	3	406	Medium1a	20,239	580	1,043	0	0

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
5	Chic	Solid	BR	South	3	429	Medium1a	19,872	580	992	0	0
5	Chic	Solid	BR	Mid-Atlantic	1	20	Medium1b	29,305	1,274	1,539	1,069	0
5	Chic	Solid	BR	South	1	47	Medium1b	29,076	1,410	1,614	1,279	0
5	Chic	Solid	BR	Mid-Atlantic	2	166	Medium1b	28,830	747	1,559	331	0
5	Chic	Solid	BR	South	2	394	Medium1b	28,427	736	1,614	336	0
5	Chic	Solid	BR	Mid-Atlantic	3	124	Medium1b	28,237	580	1,122	0	0
5	Chic	Solid	BR	South	3	295	Medium1b	27,751	580	1,083	0	0
5	Chic	Solid	BR	Mid-Atlantic	1	30	Medium1b	29,619	1,623	1,732	1,557	0
5	Chic	Solid	BR	South	1	31	Medium1b	30,128	2,501	2,261	2,807	0
5	Chic	Solid	BR	Mid-Atlantic	2	249	Medium1b	28,854	774	3,268	369	0
5	Chic	Solid	BR	South	2	262	Medium1b	28,451	761	2,269	371	0
5	Chic	Solid	BR	Mid-Atlantic	3	187	Medium1b	28,237	580	1,122	0	0
5	Chic	Solid	BR	South	3	196	Medium1b	27,751	580	1,083	0	0
5	Chic	Solid	BR	Mid-Atlantic	1	24	Medium2	41,467	1,570	1,714	1,483	0
5	Chic	Solid	BR	South	1	73	Medium2	41,417	1,772	1,838	1,786	0
5	Chic	Solid	BR	Mid-Atlantic	2	295	Medium2	40,767	794	1,744	397	0
5	Chic	Solid	BR	South	2	880	Medium2	40,467	787	1,772	407	0
5	Chic	Solid	BR	Mid-Atlantic	3	194	Medium2	40,132	580	1,133	0	0
5	Chic	Solid	BR	South	3	580	Medium2	39,743	580	1,092	0	0
5	Chic	Solid	BR	Mid-Atlantic	1	37	Medium2	41,915	2,067	1,990	2,180	0
5	Chic	Solid	BR	South	1	49	Medium2	42,929	3,340	2,766	3,982	0
5	Chic	Solid	BR	Mid-Atlantic	2	442	Medium2	40,791	821	4,249	435	0
5	Chic	Solid	BR	South	2	587	Medium2	40,485	805	2,779	432	0
5	Chic	Solid	BR	Mid-Atlantic	3	292	Medium2	40,132	580	1,133	0	0
5	Chic	Solid	BR	South	3	387	Medium2	39,743	580	1,092	0	0
5	Chic	Solid	LA	Midwest	1	1	Large1	59,137	2,901	1,123	4,426	0
5	Chic	Solid	LA	South	1	2	Large1	52,774	2,430	1,457	3,441	0
5	Chic	Solid	LA	Midwest	2	41	Large1	58,186	875	1,235	660	0
5	Chic	Solid	LA	South	2	76	Large1	51,323	821	1,315	545	0

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
5	Chic	Solid	LA	Midwest	3	46	Large1	57,840	580	439	0	0
5	Chic	Solid	LA	South	3	86	Large1	50,843	580	412	0	0
5	Chic	Solid	LA	Midwest	1	1	Large1	65,120	15,651	4,798	28,125	0
5	Chic	Solid	LA	South	1	2	Large1	61,940	12,589	7,086	21,728	0
5	Chic	Solid	LA	Midwest	2	61	Large1	58,227	962	2,370	822	0
5	Chic	Solid	LA	South	2	51	Large1	51,387	892	3,330	674	0
5	Chic	Solid	LA	Midwest	3	69	Large1	57,840	580	439	0	0
5	Chic	Solid	LA	South	3	58	Large1	50,843	580	412	0	0
5	Chic	Solid	LA	Midwest	1	0	Large2	259,389	10,799	4,442	19,106	0
5	Chic	Solid	LA	South	1	0	Large2	158,261	6,153	4,120	10,143	0
5	Chic	Solid	LA	Midwest	2	9	Large2	254,878	1,187	3,101	1,239	0
5	Chic	Solid	LA	South	2	24	Large2	153,681	1,076	2,848	1,004	0
5	Chic	Solid	LA	Midwest	3	10	Large2	254,386	580	1,481	0	0
5	Chic	Solid	LA	South	3	27	Large2	152,971	580	1,012	0	0
5	Chic	Solid	LA	Midwest	1	0	Large2	285,727	66,923	20,617	123,431	0
5	Chic	Solid	LA	South	1	0	Large2	185,877	36,762	21,080	65,239	0
5	Chic	Solid	LA	Midwest	2	14	Large2	254,898	1,230	4,751	1,319	0
5	Chic	Solid	LA	South	2	16	Large2	153,712	1,111	5,955	1,067	0
5	Chic	Solid	LA	Midwest	3	16	Large2	254,386	580	1,481	0	0
5	Chic	Solid	LA	South	3	18	Large2	152,971	580	1,012	0	0
5	Chic	Solid	LA	Midwest	1	4	Medium1a	8,268	895	272	697	0
5	Chic	Solid	LA	South	1	5	Medium1a	6,146	784	292	478	0
5	Chic	Solid	LA	Midwest	2	34	Medium1a	8,187	722	317	376	0
5	Chic	Solid	LA	South	2	47	Medium1a	6,067	696	307	321	0
5	Chic	Solid	LA	Midwest	3	18	Medium1a	7,913	580	166	0	0
5	Chic	Solid	LA	South	3	26	Medium1a	5,700	580	159	0	0
5	Chic	Solid	LA	Midwest	1	6	Medium1a	9,081	2,626	771	3,914	0
5	Chic	Solid	LA	South	1	4	Medium1a	7,157	1,905	913	2,495	0
5	Chic	Solid	LA	Midwest	2	50	Medium1a	8,203	757	499	439	0

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
5	Chic	Solid	LA	South	2	31	Medium1a	6,092	724	571	371	0
5	Chic	Solid	LA	Midwest	3	28	Medium1a	7,913	580	166	0	0
5	Chic	Solid	LA	South	3	17	Medium1a	5,700	580	159	0	0
5	Chic	Solid	LA	Midwest	1	2	Medium1b	11,362	1,017	333	924	0
5	Chic	Solid	LA	South	1	4	Medium1b	8,384	863	338	621	0
5	Chic	Solid	LA	Midwest	2	22	Medium1b	11,224	722	412	376	0
5	Chic	Solid	LA	South	2	31	Medium1b	8,234	696	368	321	0
5	Chic	Solid	LA	Midwest	3	12	Medium1b	10,950	580	192	0	0
5	Chic	Solid	LA	South	3	17	Medium1b	7,867	580	161	0	0
5	Chic	Solid	LA	Midwest	1	4	Medium1b	12,489	3,418	1,025	5,387	0
5	Chic	Solid	LA	South	1	2	Medium1b	9,787	2,417	1,199	3,419	0
5	Chic	Solid	LA	Midwest	2	33	Medium1b	11,240	757	639	439	0
5	Chic	Solid	LA	South	2	21	Medium1b	8,259	724	709	371	0
5	Chic	Solid	LA	Midwest	3	18	Medium1b	10,950	580	192	0	0
5	Chic	Solid	LA	South	3	12	Medium1b	7,867	580	161	0	0
5	Chic	Solid	LA	Midwest	1	7	Medium2	20,828	1,390	470	1,618	0
5	Chic	Solid	LA	South	1	12	Medium2	17,759	1,194	572	1,216	0
5	Chic	Solid	LA	Midwest	2	58	Medium2	20,582	865	610	641	0
5	Chic	Solid	LA	South	2	106	Medium2	17,415	813	640	530	0
5	Chic	Solid	LA	Midwest	3	47	Medium2	20,240	580	221	0	0
5	Chic	Solid	LA	South	3	85	Medium2	16,943	580	212	0	0
5	Chic	Solid	LA	Midwest	1	11	Medium2	22,917	5,842	1,753	9,892	0
5	Chic	Solid	LA	South	1	8	Medium2	20,801	4,566	2,440	7,285	0
5	Chic	Solid	LA	Midwest	2	88	Medium2	20,621	949	1,043	797	0
5	Chic	Solid	LA	South	2	70	Medium2	17,477	881	1,373	654	0
5	Chic	Solid	LA	Midwest	3	70	Medium2	20,240	580	221	0	0
5	Chic	Solid	LA	South	3	57	Medium2	16,943	580	212	0	0
5	Chic	Liquid	LW	South	1	14	Large1	107,584	1,128	2,590	1,097	0
5	Chic	Liquid	LW	South	2	130	Large1	107,287	799	23,262	505	0

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
5	Chic	Liquid	LW	South	3	71	Large1	106,827	580	7,046	0	0
5	Chic	Liquid	LW	South	1	10	Large1	110,298	4,135	4,257	6,511	0
5	Chic	Liquid	LW	South	2	87	Large1	107,325	841	20,209	580	0
5	Chic	Liquid	LW	South	3	48	Large1	106,827	580	2,745	0	0
5	Chic	Liquid	LW	South	1	58	Medium2	10,233	603	362	153	0
5	Chic	Liquid	LW	South	2	236	Medium2	10,221	590	1,232	130	0
5	Chic	Liquid	LW	South	3	186	Medium2	9,949	580	530	0	0
5	Chic	Liquid	LW	South	1	39	Medium2	10,347	729	432	380	0
5	Chic	Liquid	LW	South	2	157	Medium2	10,259	632	1,126	205	0
5	Chic	Liquid	LW	South	3	124	Medium2	9,949	580	350	0	0
5a	Chic	Solid	BR	Mid-Atlantic	1	19	Large1	64,538	2,214	2,249	2,391	0
5a	Chic	Solid	BR	South	1	59	Large1	65,498	2,453	2,432	2,740	0
5a	Chic	Solid	BR	Mid-Atlantic	2	275	Large1	63,405	890	2,289	536	0
5a	Chic	Solid	BR	South	2	850	Large1	63,932	851	2,158	496	0
5a	Chic	Solid	BR	Mid-Atlantic	3	134	Large1	62,675	580	1,355	0	0
5a	Chic	Solid	BR	South	3	416	Large1	63,142	580	1,268	0	0
5a	Chic	Solid	BR	Mid-Atlantic	1	28	Large1	65,240	3,036	2,680	3,541	0
5a	Chic	Solid	BR	South	1	39	Large1	67,908	4,917	3,912	6,189	0
5a	Chic	Solid	BR	Mid-Atlantic	2	412	Large1	63,427	916	6,327	573	0
5a	Chic	Solid	BR	South	2	567	Large1	63,964	884	3,538	543	0
5a	Chic	Solid	BR	Mid-Atlantic	3	202	Large1	62,675	580	1,355	0	0
5a	Chic	Solid	BR	South	3	278	Large1	63,142	580	1,268	0	0
5a	Chic	Solid	BR	Mid-Atlantic	1	3	Large2	168,396	4,878	4,342	6,120	0
5a	Chic	Solid	BR	South	1	13	Large2	155,678	5,064	4,659	6,395	0
5a	Chic	Solid	BR	Mid-Atlantic	2	53	Large2	165,119	1,047	3,439	756	0
5a	Chic	Solid	BR	South	2	181	Large2	151,693	988	3,248	688	0
5a	Chic	Solid	BR	Mid-Atlantic	3	21	Large2	164,255	580	2,049	0	0
5a	Chic	Solid	BR	South	3	88	Large2	150,769	580	1,927	0	0
5a	Chic	Solid	BR	Mid-Atlantic	1	4	Large2	170,244	7,038	5,476	9,144	0

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
5a	Chic	Solid	BR	South	1	8	Large2	161,445	10,963	8,201	14,653	0
5a	Chic	Solid	BR	Mid-Atlantic	2	79	Large2	165,162	1,097	10,330	827	0
5a	Chic	Solid	BR	South	2	120	Large2	151,736	1,033	5,286	751	0
5a	Chic	Solid	BR	Mid-Atlantic	3	32	Large2	164,255	580	2,049	0	0
5a	Chic	Solid	BR	South	3	59	Large2	150,769	580	1,927	0	0
5a	Chic	Solid	BR	Mid-Atlantic	1	43	Medium1a	21,127	1,075	1,351	791	0
5a	Chic	Solid	BR	South	1	102	Medium1a	20,967	1,172	1,383	946	0
5a	Chic	Solid	BR	Mid-Atlantic	2	362	Medium1a	20,831	747	1,362	331	0
5a	Chic	Solid	BR	South	2	858	Medium1a	20,547	736	1,382	336	0
5a	Chic	Solid	BR	Mid-Atlantic	3	271	Medium1a	20,239	580	1,043	0	0
5a	Chic	Solid	BR	South	3	643	Medium1a	19,872	580	992	0	0
5a	Chic	Solid	BR	Mid-Atlantic	1	65	Medium1a	21,351	1,324	1,488	1,139	0
5a	Chic	Solid	BR	South	1	68	Medium1a	21,717	1,950	1,844	2,036	0
5a	Chic	Solid	BR	Mid-Atlantic	2	542	Medium1a	20,856	774	2,481	369	0
5a	Chic	Solid	BR	South	2	572	Medium1a	20,571	761	1,849	371	0
5a	Chic	Solid	BR	Mid-Atlantic	3	406	Medium1a	20,239	580	1,043	0	0
5a	Chic	Solid	BR	South	3	429	Medium1a	19,872	580	992	0	0
5a	Chic	Solid	BR	Mid-Atlantic	1	20	Medium1b	29,305	1,274	1,539	1,069	0
5a	Chic	Solid	BR	South	1	47	Medium1b	29,076	1,410	1,614	1,279	0
5a	Chic	Solid	BR	Mid-Atlantic	2	166	Medium1b	28,830	747	1,559	331	0
5a	Chic	Solid	BR	South	2	394	Medium1b	28,427	736	1,614	336	0
5a	Chic	Solid	BR	Mid-Atlantic	3	124	Medium1b	28,237	580	1,122	0	0
5a	Chic	Solid	BR	South	3	295	Medium1b	27,751	580	1,083	0	0
5a	Chic	Solid	BR	Mid-Atlantic	1	30	Medium1b	29,619	1,623	1,732	1,557	0
5a	Chic	Solid	BR	South	1	31	Medium1b	30,128	2,501	2,261	2,807	0
5a	Chic	Solid	BR	Mid-Atlantic	2	249	Medium1b	28,854	774	3,268	369	0
5a	Chic	Solid	BR	South	2	262	Medium1b	28,451	761	2,269	371	0
5a	Chic	Solid	BR	Mid-Atlantic	3	187	Medium1b	28,237	580	1,122	0	0
5a	Chic	Solid	BR	South	3	196	Medium1b	27,751	580	1,083	0	0

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
5a	Chic	Solid	BR	Mid-Atlantic	1	24	Medium2	41,467	1,570	1,714	1,483	0
5a	Chic	Solid	BR	South	1	73	Medium2	41,417	1,772	1,838	1,786	0
5a	Chic	Solid	BR	Mid-Atlantic	2	295	Medium2	40,767	794	1,744	397	0
5a	Chic	Solid	BR	South	2	880	Medium2	40,467	787	1,772	407	0
5a	Chic	Solid	BR	Mid-Atlantic	3	194	Medium2	40,132	580	1,133	0	0
5a	Chic	Solid	BR	South	3	580	Medium2	39,743	580	1,092	0	0
5a	Chic	Solid	BR	Mid-Atlantic	1	37	Medium2	41,915	2,067	1,990	2,180	0
5a	Chic	Solid	BR	South	1	49	Medium2	42,929	3,340	2,766	3,982	0
5a	Chic	Solid	BR	Mid-Atlantic	2	442	Medium2	40,791	821	4,249	435	0
5a	Chic	Solid	BR	South	2	587	Medium2	40,485	805	2,779	432	0
5a	Chic	Solid	BR	Mid-Atlantic	3	292	Medium2	40,132	580	1,133	0	0
5a	Chic	Solid	BR	South	3	387	Medium2	39,743	580	1,092	0	0
5a	Chic	Solid	LA	Midwest	1	1	Large1	59,137	2,901	1,123	4,426	0
5a	Chic	Solid	LA	South	1	2	Large1	52,774	2,430	1,457	3,441	0
5a	Chic	Solid	LA	Midwest	2	41	Large1	58,186	875	1,235	660	0
5a	Chic	Solid	LA	South	2	76	Large1	51,323	821	1,315	545	0
5a	Chic	Solid	LA	Midwest	3	46	Large1	57,840	580	439	0	0
5a	Chic	Solid	LA	South	3	86	Large1	50,843	580	412	0	0
5a	Chic	Solid	LA	Midwest	1	1	Large1	65,120	15,651	4,798	28,125	0
5a	Chic	Solid	LA	South	1	2	Large1	61,940	12,589	7,086	21,728	0
5a	Chic	Solid	LA	Midwest	2	61	Large1	58,227	962	2,370	822	0
5a	Chic	Solid	LA	South	2	51	Large1	51,387	892	3,330	674	0
5a	Chic	Solid	LA	Midwest	3	69	Large1	57,840	580	439	0	0
5a	Chic	Solid	LA	South	3	58	Large1	50,843	580	412	0	0
5a	Chic	Solid	LA	Midwest	1	0	Large2	259,389	10,799	4,442	19,106	0
5a	Chic	Solid	LA	South	1	0	Large2	158,261	6,153	4,120	10,143	0
5a	Chic	Solid	LA	Midwest	2	9	Large2	254,878	1,187	3,101	1,239	0
5a	Chic	Solid	LA	South	2	24	Large2	153,681	1,076	2,848	1,004	0
5a	Chic	Solid	LA	Midwest	3	10	Large2	254,386	580	1,481	0	0

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
5a	Chic	Solid	LA	South	3	27	Large2	152,971	580	1,012	0	0
5a	Chic	Solid	LA	Midwest	1	0	Large2	285,727	66,923	20,617	123,431	0
5a	Chic	Solid	LA	South	1	0	Large2	185,877	36,762	21,080	65,239	0
5a	Chic	Solid	LA	Midwest	2	14	Large2	254,898	1,230	4,751	1,319	0
5a	Chic	Solid	LA	South	2	16	Large2	153,712	1,111	5,955	1,067	0
5a	Chic	Solid	LA	Midwest	3	16	Large2	254,386	580	1,481	0	0
5a	Chic	Solid	LA	South	3	18	Large2	152,971	580	1,012	0	0
5a	Chic	Solid	LA	Midwest	1	4	Medium1a	8,268	895	272	697	0
5a	Chic	Solid	LA	South	1	5	Medium1a	6,146	784	292	478	0
5a	Chic	Solid	LA	Midwest	2	34	Medium1a	8,187	722	317	376	0
5a	Chic	Solid	LA	South	2	47	Medium1a	6,067	696	307	321	0
5a	Chic	Solid	LA	Midwest	3	18	Medium1a	7,913	580	166	0	0
5a	Chic	Solid	LA	South	3	26	Medium1a	5,700	580	159	0	0
5a	Chic	Solid	LA	Midwest	1	6	Medium1a	9,081	2,626	771	3,914	0
5a	Chic	Solid	LA	South	1	4	Medium1a	7,157	1,905	913	2,495	0
5a	Chic	Solid	LA	Midwest	2	50	Medium1a	8,203	757	499	439	0
5a	Chic	Solid	LA	South	2	31	Medium1a	6,092	724	571	371	0
5a	Chic	Solid	LA	Midwest	3	28	Medium1a	7,913	580	166	0	0
5a	Chic	Solid	LA	South	3	17	Medium1a	5,700	580	159	0	0
5a	Chic	Solid	LA	Midwest	1	2	Medium1b	11,362	1,017	333	924	0
5a	Chic	Solid	LA	South	1	4	Medium1b	8,384	863	338	621	0
5a	Chic	Solid	LA	Midwest	2	22	Medium1b	11,224	722	412	376	0
5a	Chic	Solid	LA	South	2	31	Medium1b	8,234	696	368	321	0
5a	Chic	Solid	LA	Midwest	3	12	Medium1b	10,950	580	192	0	0
5a	Chic	Solid	LA	South	3	17	Medium1b	7,867	580	161	0	0
5a	Chic	Solid	LA	Midwest	1	4	Medium1b	12,489	3,418	1,025	5,387	0
5a	Chic	Solid	LA	South	1	2	Medium1b	9,787	2,417	1,199	3,419	0
5a	Chic	Solid	LA	Midwest	2	33	Medium1b	11,240	757	639	439	0
5a	Chic	Solid	LA	South	2	21	Medium1b	8,259	724	709	371	0

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
5a	Chic	Solid	LA	Midwest	3	18	Medium1b	10,950	580	192	0	0
5a	Chic	Solid	LA	South	3	12	Medium1b	7,867	580	161	0	0
5a	Chic	Solid	LA	Midwest	1	7	Medium2	20,828	1,390	470	1,618	0
5a	Chic	Solid	LA	South	1	12	Medium2	17,759	1,194	572	1,216	0
5a	Chic	Solid	LA	Midwest	2	58	Medium2	20,582	865	610	641	0
5a	Chic	Solid	LA	South	2	106	Medium2	17,415	813	640	530	0
5a	Chic	Solid	LA	Midwest	3	47	Medium2	20,240	580	221	0	0
5a	Chic	Solid	LA	South	3	85	Medium2	16,943	580	212	0	0
5a	Chic	Solid	LA	Midwest	1	11	Medium2	22,917	5,842	1,753	9,892	0
5a	Chic	Solid	LA	South	1	8	Medium2	20,801	4,566	2,440	7,285	0
5a	Chic	Solid	LA	Midwest	2	88	Medium2	20,621	949	1,043	797	0
5a	Chic	Solid	LA	South	2	70	Medium2	17,477	881	1,373	654	0
5a	Chic	Solid	LA	Midwest	3	70	Medium2	20,240	580	221	0	0
5a	Chic	Solid	LA	South	3	57	Medium2	16,943	580	212	0	0
5a	Chic	Liquid	LW	South	1	14	Large1	1,053	1,128	460	1,097	0
5a	Chic	Liquid	LW	South	2	130	Large1	107,287	799	23,262	505	0
5a	Chic	Liquid	LW	South	3	71	Large1	106,827	580	136	0	0
5a	Chic	Liquid	LW	South	1	10	Large1	3,767	4,135	2,126	6,511	0
5a	Chic	Liquid	LW	South	2	87	Large1	107,325	841	20,209	580	0
5a	Chic	Liquid	LW	South	3	48	Large1	106,827	580	136	0	0
5a	Chic	Liquid	LW	South	1	58	Medium2	415	603	166	153	0
5a	Chic	Liquid	LW	South	2	236	Medium2	10,221	590	1,232	130	0
5a	Chic	Liquid	LW	South	3	186	Medium2	9,949	580	133	0	0
5a	Chic	Liquid	LW	South	1	39	Medium2	529	729	236	380	0
5a	Chic	Liquid	LW	South	2	157	Medium2	10,259	632	1,126	205	0
5a	Chic	Liquid	LW	South	3	124	Medium2	9,949	580	133	0	0
7	Chic	Solid	BR	Mid-Atlantic	1	19	Large1	64,538	2,214	2,249	2,391	0
7	Chic	Solid	BR	South	1	59	Large1	65,498	2,453	2,432	2,740	0
7	Chic	Solid	BR	Mid-Atlantic	2	275	Large1	63,405	890	2,289	536	0

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
7	Chic	Solid	BR	South	2	850	Large1	63,932	851	2,158	496	0
7	Chic	Solid	BR	Mid-Atlantic	3	134	Large1	62,675	580	1,355	0	0
7	Chic	Solid	BR	South	3	416	Large1	63,142	580	1,268	0	0
7	Chic	Solid	BR	Mid-Atlantic	1	28	Large1	65,240	3,036	2,680	3,541	0
7	Chic	Solid	BR	South	1	39	Large1	67,908	4,917	3,912	6,189	0
7	Chic	Solid	BR	Mid-Atlantic	2	412	Large1	63,427	916	6,327	573	0
7	Chic	Solid	BR	South	2	567	Large1	63,964	884	3,538	543	0
7	Chic	Solid	BR	Mid-Atlantic	3	202	Large1	62,675	580	1,355	0	0
7	Chic	Solid	BR	South	3	278	Large1	63,142	580	1,268	0	0
7	Chic	Solid	BR	Mid-Atlantic	1	3	Large2	168,396	4,878	4,342	6,120	0
7	Chic	Solid	BR	South	1	13	Large2	155,678	5,064	4,659	6,395	0
7	Chic	Solid	BR	Mid-Atlantic	2	53	Large2	165,119	1,047	3,439	756	0
7	Chic	Solid	BR	South	2	181	Large2	151,693	988	3,248	688	0
7	Chic	Solid	BR	Mid-Atlantic	3	21	Large2	164,255	580	2,049	0	0
7	Chic	Solid	BR	South	3	88	Large2	150,769	580	1,927	0	0
7	Chic	Solid	BR	Mid-Atlantic	1	4	Large2	170,244	7,038	5,476	9,144	0
7	Chic	Solid	BR	South	1	8	Large2	161,445	10,963	8,201	14,653	0
7	Chic	Solid	BR	Mid-Atlantic	2	79	Large2	165,162	1,097	10,330	827	0
7	Chic	Solid	BR	South	2	120	Large2	151,736	1,033	5,286	751	0
7	Chic	Solid	BR	Mid-Atlantic	3	32	Large2	164,255	580	2,049	0	0
7	Chic	Solid	BR	South	3	59	Large2	150,769	580	1,927	0	0
7	Chic	Solid	BR	Mid-Atlantic	1	43	Medium1a	21,127	1,075	1,351	791	0
7	Chic	Solid	BR	South	1	102	Medium1a	20,967	1,172	1,383	946	0
7	Chic	Solid	BR	Mid-Atlantic	2	362	Medium1a	20,831	747	1,362	331	0
7	Chic	Solid	BR	South	2	858	Medium1a	20,547	736	1,382	336	0
7	Chic	Solid	BR	Mid-Atlantic	3	271	Medium1a	20,239	580	1,043	0	0
7	Chic	Solid	BR	South	3	643	Medium1a	19,872	580	992	0	0
7	Chic	Solid	BR	Mid-Atlantic	1	65	Medium1a	21,351	1,324	1,488	1,139	0
7	Chic	Solid	BR	South	1	68	Medium1a	21,717	1,950	1,844	2,036	0

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
7	Chic	Solid	BR	Mid-Atlantic	2	542	Medium1a	20,856	774	2,481	369	0
7	Chic	Solid	BR	South	2	572	Medium1a	20,571	761	1,849	371	0
7	Chic	Solid	BR	Mid-Atlantic	3	406	Medium1a	20,239	580	1,043	0	0
7	Chic	Solid	BR	South	3	429	Medium1a	19,872	580	992	0	0
7	Chic	Solid	BR	Mid-Atlantic	1	20	Medium1b	29,305	1,274	1,539	1,069	0
7	Chic	Solid	BR	South	1	47	Medium1b	29,076	1,410	1,614	1,279	0
7	Chic	Solid	BR	Mid-Atlantic	2	166	Medium1b	28,830	747	1,559	331	0
7	Chic	Solid	BR	South	2	394	Medium1b	28,427	736	1,614	336	0
7	Chic	Solid	BR	Mid-Atlantic	3	124	Medium1b	28,237	580	1,122	0	0
7	Chic	Solid	BR	South	3	295	Medium1b	27,751	580	1,083	0	0
7	Chic	Solid	BR	Mid-Atlantic	1	30	Medium1b	29,619	1,623	1,732	1,557	0
7	Chic	Solid	BR	South	1	31	Medium1b	30,128	2,501	2,261	2,807	0
7	Chic	Solid	BR	Mid-Atlantic	2	249	Medium1b	28,854	774	3,268	369	0
7	Chic	Solid	BR	South	2	262	Medium1b	28,451	761	2,269	371	0
7	Chic	Solid	BR	Mid-Atlantic	3	187	Medium1b	28,237	580	1,122	0	0
7	Chic	Solid	BR	South	3	196	Medium1b	27,751	580	1,083	0	0
7	Chic	Solid	BR	Mid-Atlantic	1	24	Medium2	41,467	1,570	1,714	1,483	0
7	Chic	Solid	BR	South	1	73	Medium2	41,417	1,772	1,838	1,786	0
7	Chic	Solid	BR	Mid-Atlantic	2	295	Medium2	40,767	794	1,744	397	0
7	Chic	Solid	BR	South	2	880	Medium2	40,467	787	1,772	407	0
7	Chic	Solid	BR	Mid-Atlantic	3	194	Medium2	40,132	580	1,133	0	0
7	Chic	Solid	BR	South	3	580	Medium2	39,743	580	1,092	0	0
7	Chic	Solid	BR	Mid-Atlantic	1	37	Medium2	41,915	2,067	1,990	2,180	0
7	Chic	Solid	BR	South	1	49	Medium2	42,929	3,340	2,766	3,982	0
7	Chic	Solid	BR	Mid-Atlantic	2	442	Medium2	40,791	821	4,249	435	0
7	Chic	Solid	BR	South	2	587	Medium2	40,485	805	2,779	432	0
7	Chic	Solid	BR	Mid-Atlantic	3	292	Medium2	40,132	580	1,133	0	0
7	Chic	Solid	BR	South	3	387	Medium2	39,743	580	1,092	0	0
7	Chic	Solid	LA	Midwest	1	1	Large1	59,137	2,901	1,123	4,426	0

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
7	Chic	Solid	LA	South	1	2	Large1	52,774	2,430	1,457	3,441	0
7	Chic	Solid	LA	Midwest	2	41	Large1	58,186	875	1,235	660	0
7	Chic	Solid	LA	South	2	76	Large1	51,323	821	1,315	545	0
7	Chic	Solid	LA	Midwest	3	46	Large1	57,840	580	439	0	0
7	Chic	Solid	LA	South	3	86	Large1	50,843	580	412	0	0
7	Chic	Solid	LA	Midwest	1	1	Large1	65,120	15,651	4,798	28,125	0
7	Chic	Solid	LA	South	1	2	Large1	61,940	12,589	7,086	21,728	0
7	Chic	Solid	LA	Midwest	2	61	Large1	58,227	962	2,370	822	0
7	Chic	Solid	LA	South	2	51	Large1	51,387	892	3,330	674	0
7	Chic	Solid	LA	Midwest	3	69	Large1	57,840	580	439	0	0
7	Chic	Solid	LA	South	3	58	Large1	50,843	580	412	0	0
7	Chic	Solid	LA	Midwest	1	0	Large2	259,389	10,799	4,442	19,106	0
7	Chic	Solid	LA	South	1	0	Large2	158,261	6,153	4,120	10,143	0
7	Chic	Solid	LA	Midwest	2	9	Large2	254,878	1,187	3,101	1,239	0
7	Chic	Solid	LA	South	2	24	Large2	153,681	1,076	2,848	1,004	0
7	Chic	Solid	LA	Midwest	3	10	Large2	254,386	580	1,481	0	0
7	Chic	Solid	LA	South	3	27	Large2	152,971	580	1,012	0	0
7	Chic	Solid	LA	Midwest	1	0	Large2	285,727	66,923	20,617	123,431	0
7	Chic	Solid	LA	South	1	0	Large2	185,877	36,762	21,080	65,239	0
7	Chic	Solid	LA	Midwest	2	14	Large2	254,898	1,230	4,751	1,319	0
7	Chic	Solid	LA	South	2	16	Large2	153,712	1,111	5,955	1,067	0
7	Chic	Solid	LA	Midwest	3	16	Large2	254,386	580	1,481	0	0
7	Chic	Solid	LA	South	3	18	Large2	152,971	580	1,012	0	0
7	Chic	Solid	LA	Midwest	1	4	Medium1a	8,268	895	272	697	0
7	Chic	Solid	LA	South	1	5	Medium1a	6,146	784	292	478	0
7	Chic	Solid	LA	Midwest	2	34	Medium1a	8,187	722	317	376	0
7	Chic	Solid	LA	South	2	47	Medium1a	6,067	696	307	321	0
7	Chic	Solid	LA	Midwest	3	18	Medium1a	7,913	580	166	0	0
7	Chic	Solid	LA	South	3	26	Medium1a	5,700	580	159	0	0

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
7	Chic	Solid	LA	Midwest	1	6	Medium1a	9,081	2,626	771	3,914	0
7	Chic	Solid	LA	South	1	4	Medium1a	7,157	1,905	913	2,495	0
7	Chic	Solid	LA	Midwest	2	50	Medium1a	8,203	757	499	439	0
7	Chic	Solid	LA	South	2	31	Medium1a	6,092	724	571	371	0
7	Chic	Solid	LA	Midwest	3	28	Medium1a	7,913	580	166	0	0
7	Chic	Solid	LA	South	3	17	Medium1a	5,700	580	159	0	0
7	Chic	Solid	LA	Midwest	1	2	Medium1b	11,362	1,017	333	924	0
7	Chic	Solid	LA	South	1	4	Medium1b	8,384	863	338	621	0
7	Chic	Solid	LA	Midwest	2	22	Medium1b	11,224	722	412	376	0
7	Chic	Solid	LA	South	2	31	Medium1b	8,234	696	368	321	0
7	Chic	Solid	LA	Midwest	3	12	Medium1b	10,950	580	192	0	0
7	Chic	Solid	LA	South	3	17	Medium1b	7,867	580	161	0	0
7	Chic	Solid	LA	Midwest	1	4	Medium1b	12,489	3,418	1,025	5,387	0
7	Chic	Solid	LA	South	1	2	Medium1b	9,787	2,417	1,199	3,419	0
7	Chic	Solid	LA	Midwest	2	33	Medium1b	11,240	757	639	439	0
7	Chic	Solid	LA	South	2	21	Medium1b	8,259	724	709	371	0
7	Chic	Solid	LA	Midwest	3	18	Medium1b	10,950	580	192	0	0
7	Chic	Solid	LA	South	3	12	Medium1b	7,867	580	161	0	0
7	Chic	Solid	LA	Midwest	1	7	Medium2	20,828	1,390	470	1,618	0
7	Chic	Solid	LA	South	1	12	Medium2	17,759	1,194	572	1,216	0
7	Chic	Solid	LA	Midwest	2	58	Medium2	20,582	865	610	641	0
7	Chic	Solid	LA	South	2	106	Medium2	17,415	813	640	530	0
7	Chic	Solid	LA	Midwest	3	47	Medium2	20,240	580	221	0	0
7	Chic	Solid	LA	South	3	85	Medium2	16,943	580	212	0	0
7	Chic	Solid	LA	Midwest	1	11	Medium2	22,917	5,842	1,753	9,892	0
7	Chic	Solid	LA	South	1	8	Medium2	20,801	4,566	2,440	7,285	0
7	Chic	Solid	LA	Midwest	2	88	Medium2	20,621	949	1,043	797	0
7	Chic	Solid	LA	South	2	70	Medium2	17,477	881	1,373	654	0
7	Chic	Solid	LA	Midwest	3	70	Medium2	20,240	580	221	0	0

Cost for Poultry Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yr. rec.	5yr. rec.
7	Chic	Solid	LA	South	3	57	Medium2	16,943	580	212	0	0
7	Chic	Liquid	LW	South	1	14	Large1	1,053	1,128	460	1,097	0
7	Chic	Liquid	LW	South	2	130	Large1	107,287	799	23,262	505	0
7	Chic	Liquid	LW	South	3	71	Large1	106,827	580	7,046	0	0
7	Chic	Liquid	LW	South	1	10	Large1	3,767	4,135	2,126	6,511	0
7	Chic	Liquid	LW	South	2	87	Large1	107,325	841	20,209	580	0
7	Chic	Liquid	LW	South	3	48	Large1	106,827	580	2,745	0	0
7	Chic	Liquid	LW	South	1	58	Medium2	415	603	166	153	0
7	Chic	Liquid	LW	South	2	236	Medium2	10,221	590	1,232	130	0
7	Chic	Liquid	LW	South	3	186	Medium2	9,949	580	530	0	0
7	Chic	Liquid	LW	South	1	39	Medium2	529	729	236	380	0
7	Chic	Liquid	LW	South	2	157	Medium2	10,259	632	1,126	205	0
7	Chic	Liquid	LW	South	3	124	Medium2	9,949	580	350	0	0

Regulatory Compliance Costs for the Turkey (SL, slaughter) Operations

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yrrec	5yrrec
1	Turk	Solid	SL	Mid-Atlantic	1	30	Medium1a	7,842	1,483	1,755	1,380	0
1	Turk	Solid	SL	Mid-Atlantic	1	20	Medium1b	12,627	2,103	2,307	2,248	0
1	Turk	Solid	SL	Mid-Atlantic	1	8	Medium2	17,863	2,781	2,802	3,197	0
1	Turk	Solid	SL	Mid-Atlantic	1	5	Large1	37,378	5,266	4,674	6,676	0
1	Turk	Solid	SL	Midwest	1	26	Medium1a	18,125	1,314	1,224	1,032	0
1	Turk	Solid	SL	Midwest	1	17	Medium1b	30,109	1,818	1,572	1,660	0
1	Turk	Solid	SL	Midwest	1	7	Medium2	44,537	2,424	2,022	2,416	0
1	Turk	Solid	SL	Midwest	1	7	Large1	153,603	7,003	6,060	8,850	0
1	Turk	Solid	SL	Mid-Atlantic	2	288	Medium1a	7,780	1,401	1,762	1,266	0
1	Turk	Solid	SL	Mid-Atlantic	2	192	Medium1b	12,098	1,401	2,416	1,266	0
1	Turk	Solid	SL	Mid-Atlantic	2	127	Medium2	16,986	1,619	2,986	1,571	0
1	Turk	Solid	SL	Mid-Atlantic	2	90	Large1	35,073	2,239	5,167	2,439	0
1	Turk	Solid	SL	Midwest	2	247	Medium1a	18,215	1,434	1,280	1,182	0
1	Turk	Solid	SL	Midwest	2	165	Medium1b	29,798	1,404	1,748	1,145	0
1	Turk	Solid	SL	Midwest	2	113	Medium2	43,935	1,623	2,367	1,418	0
1	Turk	Solid	SL	Midwest	2	124	Large1	150,038	2,261	8,147	2,403	0
1	Turk	Solid	SL	Mid-Atlantic	3	123	Medium1a	6,637	580	1,297	0	0
1	Turk	Solid	SL	Mid-Atlantic	3	82	Medium1b	10,955	580	1,562	0	0
1	Turk	Solid	SL	Mid-Atlantic	3	59	Medium2	15,679	580	1,742	0	0
1	Turk	Solid	SL	Mid-Atlantic	3	60	Large1	33,290	580	2,442	0	0
1	Turk	Solid	SL	Midwest	3	106	Medium1a	17,240	580	861	0	0
1	Turk	Solid	SL	Midwest	3	70	Medium1b	28,845	580	976	0	0
1	Turk	Solid	SL	Midwest	3	52	Medium2	42,817	580	1,146	0	0
1	Turk	Solid	SL	Midwest	3	83	Large1	148,300	580	3,058	0	0
2	Turk	Solid	SL	Mid-Atlantic	1	18	Medium1a	11,037	5,716	3,718	7,306	0
2	Turk	Solid	SL	Mid-Atlantic	1	12	Medium1b	18,016	9,242	5,617	12,243	0
2	Turk	Solid	SL	Mid-Atlantic	1	5	Medium2	25,653	13,100	7,586	17,644	0
2	Turk	Solid	SL	Mid-Atlantic	1	3	Large1	54,117	27,239	14,953	37,438	0

Cost for Turkey Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yrrec	5yrrec
2	Turk	Solid	SL	Midwest	1	16	Medium1a	22,410	7,013	3,856	8,137	0
2	Turk	Solid	SL	Midwest	1	10	Medium1b	37,336	11,429	6,010	13,644	0
2	Turk	Solid	SL	Midwest	1	4	Medium2	55,305	16,747	8,635	20,273	0
2	Turk	Solid	SL	Midwest	1	4	Large1	191,109	56,888	29,093	76,673	0
2	Turk	Solid	SL	Mid-Atlantic	2	173	Medium1a	7,929	1,599	4,331	1,543	0
2	Turk	Solid	SL	Mid-Atlantic	2	115	Medium1b	12,220	1,563	7,131	1,493	0
2	Turk	Solid	SL	Mid-Atlantic	2	76	Medium2	17,116	1,790	9,830	1,811	0
2	Turk	Solid	SL	Mid-Atlantic	2	54	Large1	35,423	2,699	19,871	3,082	0
2	Turk	Solid	SL	Midwest	2	148	Medium1a	18,342	1,603	2,287	1,392	0
2	Turk	Solid	SL	Midwest	2	99	Medium1b	29,921	1,567	3,152	1,347	0
2	Turk	Solid	SL	Midwest	2	68	Medium2	44,064	1,795	4,303	1,632	0
2	Turk	Solid	SL	Midwest	2	74	Large1	150,389	2,727	13,404	3,036	0
2	Turk	Solid	SL	Mid-Atlantic	3	74	Medium1a	6,637	580	1,297	0	0
2	Turk	Solid	SL	Mid-Atlantic	3	49	Medium1b	10,955	580	1,562	0	0
2	Turk	Solid	SL	Mid-Atlantic	3	35	Medium2	15,679	580	1,742	0	0
2	Turk	Solid	SL	Mid-Atlantic	3	36	Large1	33,290	580	2,442	0	0
2	Turk	Solid	SL	Midwest	3	64	Medium1a	17,240	580	861	0	0
2	Turk	Solid	SL	Midwest	3	42	Medium1b	28,845	580	976	0	0
2	Turk	Solid	SL	Midwest	3	31	Medium2	42,817	580	1,146	0	0
2	Turk	Solid	SL	Midwest	3	50	Large1	148,300	580	3,058	0	0
3	Turk	Solid	SL	Mid-Atlantic	1	3	Medium1a	10,925	1,483	2,759	1,380	3,082
3	Turk	Solid	SL	Mid-Atlantic	1	2	Medium1b	16,881	2,103	3,334	2,248	3,082
3	Turk	Solid	SL	Mid-Atlantic	1	1	Medium2	23,397	2,781	3,854	3,197	3,082
3	Turk	Solid	SL	Mid-Atlantic	1	0	Large1	47,685	5,266	5,820	6,676	3,082
3	Turk	Solid	SL	Midwest	1	3	Medium1a	21,619	1,314	2,376	1,032	3,082
3	Turk	Solid	SL	Midwest	1	2	Medium1b	34,915	1,818	2,749	1,660	3,082
3	Turk	Solid	SL	Midwest	1	1	Medium2	50,922	2,424	3,230	2,416	3,082
3	Turk	Solid	SL	Midwest	1	1	Large1	171,906	7,003	7,505	8,850	3,082
3	Turk	Solid	SL	Mid-Atlantic	2	28	Medium1a	10,864	1,401	2,766	1,266	3,082

Cost for Turkey Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yrrec	5yrrec
3	Turk	Solid	SL	Mid-Atlantic	2	18	Medium1b	16,351	1,401	3,443	1,266	3,082
3	Turk	Solid	SL	Mid-Atlantic	2	12	Medium2	22,520	1,619	4,038	1,571	3,082
3	Turk	Solid	SL	Mid-Atlantic	2	9	Large1	45,379	2,239	6,313	2,439	3,082
3	Turk	Solid	SL	Midwest	2	27	Medium1a	21,710	1,434	2,431	1,182	3,082
3	Turk	Solid	SL	Midwest	2	18	Medium1b	34,604	1,404	2,925	1,145	3,082
3	Turk	Solid	SL	Midwest	2	12	Medium2	50,319	1,623	3,576	1,418	3,082
3	Turk	Solid	SL	Midwest	2	14	Large1	168,341	2,261	9,592	2,403	3,082
3	Turk	Solid	SL	Mid-Atlantic	3	12	Medium1a	9,721	580	2,300	0	3,082
3	Turk	Solid	SL	Mid-Atlantic	3	8	Medium1b	15,209	580	2,588	0	3,082
3	Turk	Solid	SL	Mid-Atlantic	3	6	Medium2	21,213	580	2,794	0	3,082
3	Turk	Solid	SL	Mid-Atlantic	3	6	Large1	43,597	580	3,589	0	3,082
3	Turk	Solid	SL	Midwest	3	12	Medium1a	20,734	580	2,012	0	3,082
3	Turk	Solid	SL	Midwest	3	8	Medium1b	33,651	580	2,153	0	3,082
3	Turk	Solid	SL	Midwest	3	6	Medium2	49,202	580	2,354	0	3,082
3	Turk	Solid	SL	Midwest	3	9	Large1	166,603	580	4,503	0	3,082
3	Turk	Solid	SL	Mid-Atlantic	1	4	Medium1a	14,121	5,716	4,721	7,306	3,082
3	Turk	Solid	SL	Mid-Atlantic	1	3	Medium1b	22,270	9,242	6,643	12,243	3,082
3	Turk	Solid	SL	Mid-Atlantic	1	1	Medium2	31,186	13,100	8,638	17,644	3,082
3	Turk	Solid	SL	Mid-Atlantic	1	1	Large1	64,423	27,239	16,099	37,438	3,082
3	Turk	Solid	SL	Midwest	1	4	Medium1a	25,904	7,013	5,007	8,137	3,082
3	Turk	Solid	SL	Midwest	1	3	Medium1b	42,142	11,429	7,187	13,644	3,082
3	Turk	Solid	SL	Midwest	1	1	Medium2	61,690	16,747	9,843	20,273	3,082
3	Turk	Solid	SL	Midwest	1	1	Large1	209,412	56,888	30,538	76,673	3,082
3	Turk	Solid	SL	Mid-Atlantic	2	41	Medium1a	11,013	1,599	5,334	1,543	3,082
3	Turk	Solid	SL	Mid-Atlantic	2	28	Medium1b	16,474	1,563	8,157	1,493	3,082
3	Turk	Solid	SL	Mid-Atlantic	2	18	Medium2	22,649	1,790	10,882	1,811	3,082
3	Turk	Solid	SL	Mid-Atlantic	2	13	Large1	45,729	2,699	21,017	3,082	3,082
3	Turk	Solid	SL	Midwest	2	41	Medium1a	21,837	1,603	3,439	1,392	3,082
3	Turk	Solid	SL	Midwest	2	27	Medium1b	34,726	1,567	4,330	1,347	3,082

Cost for Turkey Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yrrec	5yrrec
3	Turk	Solid	SL	Midwest	2	19	Medium2	50,449	1,795	5,511	1,632	3,082
3	Turk	Solid	SL	Midwest	2	20	Large1	168,691	2,727	14,849	3,036	3,082
3	Turk	Solid	SL	Mid-Atlantic	3	18	Medium1a	9,721	580	2,300	0	3,082
3	Turk	Solid	SL	Mid-Atlantic	3	12	Medium1b	15,209	580	2,588	0	3,082
3	Turk	Solid	SL	Mid-Atlantic	3	8	Medium2	21,213	580	2,794	0	3,082
3	Turk	Solid	SL	Mid-Atlantic	3	9	Large1	43,597	580	3,589	0	3,082
3	Turk	Solid	SL	Midwest	3	17	Medium1a	20,734	580	2,012	0	3,082
3	Turk	Solid	SL	Midwest	3	12	Medium1b	33,651	580	2,153	0	3,082
3	Turk	Solid	SL	Midwest	3	9	Medium2	49,202	580	2,354	0	3,082
3	Turk	Solid	SL	Midwest	3	14	Large1	166,603	580	4,503	0	3,082
3.1	Turk	Solid	SL	Mid-Atlantic	1	9	Medium1a	7,842	1,483	1,755	1,380	3,082
3.1	Turk	Solid	SL	Mid-Atlantic	1	6	Medium1b	12,627	2,103	2,307	2,248	3,082
3.1	Turk	Solid	SL	Mid-Atlantic	1	2	Medium2	17,863	2,781	2,802	3,197	3,082
3.1	Turk	Solid	SL	Mid-Atlantic	1	2	Large1	37,378	5,266	4,674	6,676	3,082
3.1	Turk	Solid	SL	Midwest	1	8	Medium1a	18,125	1,314	1,224	1,032	3,082
3.1	Turk	Solid	SL	Midwest	1	5	Medium1b	30,109	1,818	1,572	1,660	3,082
3.1	Turk	Solid	SL	Midwest	1	2	Medium2	44,537	2,424	2,022	2,416	3,082
3.1	Turk	Solid	SL	Midwest	1	2	Large1	153,603	7,003	6,060	8,850	3,082
3.1	Turk	Solid	SL	Mid-Atlantic	2	88	Medium1a	7,780	1,401	1,762	1,266	3,082
3.1	Turk	Solid	SL	Mid-Atlantic	2	58	Medium1b	12,098	1,401	2,416	1,266	3,082
3.1	Turk	Solid	SL	Mid-Atlantic	2	39	Medium2	16,986	1,619	2,986	1,571	3,082
3.1	Turk	Solid	SL	Mid-Atlantic	2	27	Large1	35,073	2,239	5,167	2,439	3,082
3.1	Turk	Solid	SL	Midwest	2	72	Medium1a	18,215	1,434	1,280	1,182	3,082
3.1	Turk	Solid	SL	Midwest	2	48	Medium1b	29,798	1,404	1,748	1,145	3,082
3.1	Turk	Solid	SL	Midwest	2	33	Medium2	43,935	1,623	2,367	1,418	3,082
3.1	Turk	Solid	SL	Midwest	2	36	Large1	150,038	2,261	8,147	2,403	3,082
3.1	Turk	Solid	SL	Mid-Atlantic	3	37	Medium1a	6,637	580	1,297	0	3,082
3.1	Turk	Solid	SL	Mid-Atlantic	3	25	Medium1b	10,955	580	1,562	0	3,082
3.1	Turk	Solid	SL	Mid-Atlantic	3	18	Medium2	15,679	580	1,742	0	3,082

Cost for Turkey Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yrrec	5yrrec
3.1	Turk	Solid	SL	Mid-Atlantic	3	18	Large1	33,290	580	2,442	0	3,082
3.1	Turk	Solid	SL	Midwest	3	31	Medium1a	17,240	580	861	0	3,082
3.1	Turk	Solid	SL	Midwest	3	20	Medium1b	28,845	580	976	0	3,082
3.1	Turk	Solid	SL	Midwest	3	15	Medium2	42,817	580	1,146	0	3,082
3.1	Turk	Solid	SL	Midwest	3	24	Large1	148,300	580	3,058	0	3,082
3.1	Turk	Solid	SL	Mid-Atlantic	1	14	Medium1a	11,037	5,716	3,718	7,306	3,082
3.1	Turk	Solid	SL	Mid-Atlantic	1	9	Medium1b	18,016	9,242	5,617	12,243	3,082
3.1	Turk	Solid	SL	Mid-Atlantic	1	4	Medium2	25,653	13,100	7,586	17,644	3,082
3.1	Turk	Solid	SL	Mid-Atlantic	1	2	Large1	54,117	27,239	14,953	37,438	3,082
3.1	Turk	Solid	SL	Midwest	1	11	Medium1a	22,410	7,013	3,856	8,137	3,082
3.1	Turk	Solid	SL	Midwest	1	7	Medium1b	37,336	11,429	6,010	13,644	3,082
3.1	Turk	Solid	SL	Midwest	1	3	Medium2	55,305	16,747	8,635	20,273	3,082
3.1	Turk	Solid	SL	Midwest	1	3	Large1	191,109	56,888	29,093	76,673	3,082
3.1	Turk	Solid	SL	Mid-Atlantic	2	131	Medium1a	7,929	1,599	4,331	1,543	3,082
3.1	Turk	Solid	SL	Mid-Atlantic	2	88	Medium1b	12,220	1,563	7,131	1,493	3,082
3.1	Turk	Solid	SL	Mid-Atlantic	2	58	Medium2	17,116	1,790	9,830	1,811	3,082
3.1	Turk	Solid	SL	Mid-Atlantic	2	41	Large1	35,423	2,699	19,871	3,082	3,082
3.1	Turk	Solid	SL	Midwest	2	108	Medium1a	18,342	1,603	2,287	1,392	3,082
3.1	Turk	Solid	SL	Midwest	2	72	Medium1b	29,921	1,567	3,152	1,347	3,082
3.1	Turk	Solid	SL	Midwest	2	49	Medium2	44,064	1,795	4,303	1,632	3,082
3.1	Turk	Solid	SL	Midwest	2	54	Large1	150,389	2,727	13,404	3,036	3,082
3.1	Turk	Solid	SL	Mid-Atlantic	3	56	Medium1a	6,637	580	1,297	0	3,082
3.1	Turk	Solid	SL	Mid-Atlantic	3	37	Medium1b	10,955	580	1,562	0	3,082
3.1	Turk	Solid	SL	Mid-Atlantic	3	27	Medium2	15,679	580	1,742	0	3,082
3.1	Turk	Solid	SL	Mid-Atlantic	3	27	Large1	33,290	580	2,442	0	3,082
3.1	Turk	Solid	SL	Midwest	3	46	Medium1a	17,240	580	861	0	3,082
3.1	Turk	Solid	SL	Midwest	3	30	Medium1b	28,845	580	976	0	3,082
3.1	Turk	Solid	SL	Midwest	3	23	Medium2	42,817	580	1,146	0	3,082
3.1	Turk	Solid	SL	Midwest	3	36	Large1	148,300	580	3,058	0	3,082

Cost for Turkey Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yrrec	5yrrec
4	Turk	Solid	SL	Mid-Atlantic	1	3	Medium1a	10,925	1,875	9,011	1,380	3,082
4	Turk	Solid	SL	Mid-Atlantic	1	2	Medium1b	16,881	2,495	9,586	2,248	3,082
4	Turk	Solid	SL	Mid-Atlantic	1	1	Medium2	23,397	3,173	10,106	3,197	3,082
4	Turk	Solid	SL	Mid-Atlantic	1	0	Large1	47,685	5,658	12,072	6,676	3,082
4	Turk	Solid	SL	Midwest	1	3	Medium1a	21,619	1,706	8,628	1,032	3,082
4	Turk	Solid	SL	Midwest	1	2	Medium1b	34,915	2,210	9,001	1,660	3,082
4	Turk	Solid	SL	Midwest	1	1	Medium2	50,922	2,816	9,482	2,416	3,082
4	Turk	Solid	SL	Midwest	1	1	Large1	171,906	7,395	13,757	8,850	3,082
4	Turk	Solid	SL	Mid-Atlantic	2	28	Medium1a	10,864	1,793	9,018	1,266	3,082
4	Turk	Solid	SL	Mid-Atlantic	2	18	Medium1b	16,351	1,793	9,695	1,266	3,082
4	Turk	Solid	SL	Mid-Atlantic	2	12	Medium2	22,520	2,011	10,290	1,571	3,082
4	Turk	Solid	SL	Mid-Atlantic	2	9	Large1	45,379	2,631	12,565	2,439	3,082
4	Turk	Solid	SL	Midwest	2	27	Medium1a	21,710	1,826	8,683	1,182	3,082
4	Turk	Solid	SL	Midwest	2	18	Medium1b	34,604	1,796	9,177	1,145	3,082
4	Turk	Solid	SL	Midwest	2	12	Medium2	50,319	2,015	9,828	1,418	3,082
4	Turk	Solid	SL	Midwest	2	14	Large1	168,341	2,653	15,844	2,403	3,082
4	Turk	Solid	SL	Mid-Atlantic	3	12	Medium1a	9,721	972	8,552	0	3,082
4	Turk	Solid	SL	Mid-Atlantic	3	8	Medium1b	15,209	972	8,840	0	3,082
4	Turk	Solid	SL	Mid-Atlantic	3	6	Medium2	21,213	972	9,046	0	3,082
4	Turk	Solid	SL	Mid-Atlantic	3	6	Large1	43,597	972	9,841	0	3,082
4	Turk	Solid	SL	Midwest	3	12	Medium1a	20,734	972	8,264	0	3,082
4	Turk	Solid	SL	Midwest	3	8	Medium1b	33,651	972	8,405	0	3,082
4	Turk	Solid	SL	Midwest	3	6	Medium2	49,202	972	8,606	0	3,082
4	Turk	Solid	SL	Midwest	3	9	Large1	166,603	972	10,755	0	3,082
4	Turk	Solid	SL	Mid-Atlantic	1	4	Medium1a	14,121	6,108	10,973	7,306	3,082
4	Turk	Solid	SL	Mid-Atlantic	1	3	Medium1b	22,270	9,634	12,895	12,243	3,082
4	Turk	Solid	SL	Mid-Atlantic	1	1	Medium2	31,186	13,492	14,890	17,644	3,082
4	Turk	Solid	SL	Mid-Atlantic	1	1	Large1	64,423	27,631	22,351	37,438	3,082
4	Turk	Solid	SL	Midwest	1	4	Medium1a	25,904	7,405	11,259	8,137	3,082

Cost for Turkey Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yrrec	5yrrec
4	Turk	Solid	SL	Midwest	1	3	Medium1b	42,142	11,821	13,439	13,644	3,082
4	Turk	Solid	SL	Midwest	1	1	Medium2	61,690	17,139	16,095	20,273	3,082
4	Turk	Solid	SL	Midwest	1	1	Large1	209,412	57,280	36,790	76,673	3,082
4	Turk	Solid	SL	Mid-Atlantic	2	41	Medium1a	11,013	1,991	11,586	1,543	3,082
4	Turk	Solid	SL	Mid-Atlantic	2	28	Medium1b	16,474	1,955	14,409	1,493	3,082
4	Turk	Solid	SL	Mid-Atlantic	2	18	Medium2	22,649	2,182	17,134	1,811	3,082
4	Turk	Solid	SL	Mid-Atlantic	2	13	Large1	45,729	3,091	27,269	3,082	3,082
4	Turk	Solid	SL	Midwest	2	41	Medium1a	21,837	1,995	9,691	1,392	3,082
4	Turk	Solid	SL	Midwest	2	27	Medium1b	34,726	1,959	10,582	1,347	3,082
4	Turk	Solid	SL	Midwest	2	19	Medium2	50,449	2,187	11,763	1,632	3,082
4	Turk	Solid	SL	Midwest	2	20	Large1	168,691	3,119	21,101	3,036	3,082
4	Turk	Solid	SL	Mid-Atlantic	3	18	Medium1a	9,721	972	8,552	0	3,082
4	Turk	Solid	SL	Mid-Atlantic	3	12	Medium1b	15,209	972	8,840	0	3,082
4	Turk	Solid	SL	Mid-Atlantic	3	8	Medium2	21,213	972	9,046	0	3,082
4	Turk	Solid	SL	Mid-Atlantic	3	9	Large1	43,597	972	9,841	0	3,082
4	Turk	Solid	SL	Midwest	3	17	Medium1a	20,734	972	8,264	0	3,082
4	Turk	Solid	SL	Midwest	3	12	Medium1b	33,651	972	8,405	0	3,082
4	Turk	Solid	SL	Midwest	3	9	Medium2	49,202	972	8,606	0	3,082
4	Turk	Solid	SL	Midwest	3	14	Large1	166,603	972	10,755	0	3,082
4.1	Turk	Solid	SL	Mid-Atlantic	1	9	Medium1a	7,842	1,875	8,007	1,380	3,082
4.1	Turk	Solid	SL	Mid-Atlantic	1	6	Medium1b	12,627	2,495	8,559	2,248	3,082
4.1	Turk	Solid	SL	Mid-Atlantic	1	2	Medium2	17,863	3,173	9,054	3,197	3,082
4.1	Turk	Solid	SL	Mid-Atlantic	1	2	Large1	37,378	5,658	10,926	6,676	3,082
4.1	Turk	Solid	SL	Midwest	1	8	Medium1a	18,125	1,706	7,476	1,032	3,082
4.1	Turk	Solid	SL	Midwest	1	5	Medium1b	30,109	2,210	7,824	1,660	3,082
4.1	Turk	Solid	SL	Midwest	1	2	Medium2	44,537	2,816	8,274	2,416	3,082
4.1	Turk	Solid	SL	Midwest	1	2	Large1	153,603	7,395	12,312	8,850	3,082
4.1	Turk	Solid	SL	Mid-Atlantic	2	88	Medium1a	7,780	1,793	8,014	1,266	3,082
4.1	Turk	Solid	SL	Mid-Atlantic	2	58	Medium1b	12,098	1,793	8,668	1,266	3,082

Cost for Turkey Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yrrec	5yrrec
4.1	Turk	Solid	SL	Mid-Atlantic	2	39	Medium2	16,986	2,011	9,238	1,571	3,082
4.1	Turk	Solid	SL	Mid-Atlantic	2	27	Large1	35,073	2,631	11,419	2,439	3,082
4.1	Turk	Solid	SL	Midwest	2	72	Medium1a	18,215	1,826	7,532	1,182	3,082
4.1	Turk	Solid	SL	Midwest	2	48	Medium1b	29,798	1,796	8,000	1,145	3,082
4.1	Turk	Solid	SL	Midwest	2	33	Medium2	43,935	2,015	8,619	1,418	3,082
4.1	Turk	Solid	SL	Midwest	2	36	Large1	150,038	2,653	14,399	2,403	3,082
4.1	Turk	Solid	SL	Mid-Atlantic	3	37	Medium1a	6,637	972	7,549	0	3,082
4.1	Turk	Solid	SL	Mid-Atlantic	3	25	Medium1b	10,955	972	7,814	0	3,082
4.1	Turk	Solid	SL	Mid-Atlantic	3	18	Medium2	15,679	972	7,994	0	3,082
4.1	Turk	Solid	SL	Mid-Atlantic	3	18	Large1	33,290	972	8,694	0	3,082
4.1	Turk	Solid	SL	Midwest	3	31	Medium1a	17,240	972	7,113	0	3,082
4.1	Turk	Solid	SL	Midwest	3	20	Medium1b	28,845	972	7,228	0	3,082
4.1	Turk	Solid	SL	Midwest	3	15	Medium2	42,817	972	7,398	0	3,082
4.1	Turk	Solid	SL	Midwest	3	24	Large1	148,300	972	9,310	0	3,082
4.1	Turk	Solid	SL	Mid-Atlantic	1	14	Medium1a	11,037	6,108	9,970	7,306	3,082
4.1	Turk	Solid	SL	Mid-Atlantic	1	9	Medium1b	18,016	9,634	11,869	12,243	3,082
4.1	Turk	Solid	SL	Mid-Atlantic	1	4	Medium2	25,653	13,492	13,838	17,644	3,082
4.1	Turk	Solid	SL	Mid-Atlantic	1	2	Large1	54,117	27,631	21,205	37,438	3,082
4.1	Turk	Solid	SL	Midwest	1	11	Medium1a	22,410	7,405	10,108	8,137	3,082
4.1	Turk	Solid	SL	Midwest	1	7	Medium1b	37,336	11,821	12,262	13,644	3,082
4.1	Turk	Solid	SL	Midwest	1	3	Medium2	55,305	17,139	14,887	20,273	3,082
4.1	Turk	Solid	SL	Midwest	1	3	Large1	191,109	57,280	35,345	76,673	3,082
4.1	Turk	Solid	SL	Mid-Atlantic	2	131	Medium1a	7,929	1,991	10,583	1,543	3,082
4.1	Turk	Solid	SL	Mid-Atlantic	2	88	Medium1b	12,220	1,955	13,383	1,493	3,082
4.1	Turk	Solid	SL	Mid-Atlantic	2	58	Medium2	17,116	2,182	16,082	1,811	3,082
4.1	Turk	Solid	SL	Mid-Atlantic	2	41	Large1	35,423	3,091	26,123	3,082	3,082
4.1	Turk	Solid	SL	Midwest	2	108	Medium1a	18,342	1,995	8,539	1,392	3,082
4.1	Turk	Solid	SL	Midwest	2	72	Medium1b	29,921	1,959	9,404	1,347	3,082
4.1	Turk	Solid	SL	Midwest	2	49	Medium2	44,064	2,187	10,555	1,632	3,082

Cost for Turkey Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yrrec	5yrrec
4.1	Turk	Solid	SL	Midwest	2	54	Large1	150,389	3,119	19,656	3,036	3,082
4.1	Turk	Solid	SL	Mid-Atlantic	3	56	Medium1a	6,637	972	7,549	0	3,082
4.1	Turk	Solid	SL	Mid-Atlantic	3	37	Medium1b	10,955	972	7,814	0	3,082
4.1	Turk	Solid	SL	Mid-Atlantic	3	27	Medium2	15,679	972	7,994	0	3,082
4.1	Turk	Solid	SL	Mid-Atlantic	3	27	Large1	33,290	972	8,694	0	3,082
4.1	Turk	Solid	SL	Midwest	3	46	Medium1a	17,240	972	7,113	0	3,082
4.1	Turk	Solid	SL	Midwest	3	30	Medium1b	28,845	972	7,228	0	3,082
4.1	Turk	Solid	SL	Midwest	3	23	Medium2	42,817	972	7,398	0	3,082
4.1	Turk	Solid	SL	Midwest	3	36	Large1	148,300	972	9,310	0	3,082
5	Turk	Solid	SL	Mid-Atlantic	1	12	Medium1a	7,842	1,483	1,755	1,380	0
5	Turk	Solid	SL	Mid-Atlantic	1	8	Medium1b	12,627	2,103	2,307	2,248	0
5	Turk	Solid	SL	Mid-Atlantic	1	3	Medium2	17,863	2,781	2,802	3,197	0
5	Turk	Solid	SL	Mid-Atlantic	1	2	Large1	37,378	5,266	4,674	6,676	0
5	Turk	Solid	SL	Midwest	1	10	Medium1a	18,125	1,314	1,224	1,032	0
5	Turk	Solid	SL	Midwest	1	7	Medium1b	30,109	1,818	1,572	1,660	0
5	Turk	Solid	SL	Midwest	1	3	Medium2	44,537	2,424	2,022	2,416	0
5	Turk	Solid	SL	Midwest	1	3	Large1	153,603	7,003	6,060	8,850	0
5	Turk	Solid	SL	Mid-Atlantic	2	115	Medium1a	7,780	1,401	1,762	1,266	0
5	Turk	Solid	SL	Mid-Atlantic	2	77	Medium1b	12,098	1,401	2,416	1,266	0
5	Turk	Solid	SL	Mid-Atlantic	2	51	Medium2	16,986	1,619	2,986	1,571	0
5	Turk	Solid	SL	Mid-Atlantic	2	36	Large1	35,073	2,239	5,167	2,439	0
5	Turk	Solid	SL	Midwest	2	99	Medium1a	18,215	1,434	1,280	1,182	0
5	Turk	Solid	SL	Midwest	2	66	Medium1b	29,798	1,404	1,748	1,145	0
5	Turk	Solid	SL	Midwest	2	45	Medium2	43,935	1,623	2,367	1,418	0
5	Turk	Solid	SL	Midwest	2	50	Large1	150,038	2,261	8,147	2,403	0
5	Turk	Solid	SL	Mid-Atlantic	3	49	Medium1a	6,637	580	1,297	0	0
5	Turk	Solid	SL	Mid-Atlantic	3	33	Medium1b	10,955	580	1,562	0	0
5	Turk	Solid	SL	Mid-Atlantic	3	24	Medium2	15,679	580	1,742	0	0
5	Turk	Solid	SL	Mid-Atlantic	3	24	Large1	33,290	580	2,442	0	0

Cost for Turkey Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yrrec	5yrrec
5	Turk	Solid	SL	Midwest	3	42	Medium1a	17,240	580	861	0	0
5	Turk	Solid	SL	Midwest	3	28	Medium1b	28,845	580	976	0	0
5	Turk	Solid	SL	Midwest	3	21	Medium2	42,817	580	1,146	0	0
5	Turk	Solid	SL	Midwest	3	33	Large1	148,300	580	3,058	0	0
5	Turk	Solid	SL	Mid-Atlantic	1	18	Medium1a	11,037	5,716	3,718	7,306	0
5	Turk	Solid	SL	Mid-Atlantic	1	12	Medium1b	18,016	9,242	5,617	12,243	0
5	Turk	Solid	SL	Mid-Atlantic	1	5	Medium2	25,653	13,100	7,586	17,644	0
5	Turk	Solid	SL	Mid-Atlantic	1	3	Large1	54,117	27,239	14,953	37,438	0
5	Turk	Solid	SL	Midwest	1	16	Medium1a	22,410	7,013	3,856	8,137	0
5	Turk	Solid	SL	Midwest	1	10	Medium1b	37,336	11,429	6,010	13,644	0
5	Turk	Solid	SL	Midwest	1	4	Medium2	55,305	16,747	8,635	20,273	0
5	Turk	Solid	SL	Midwest	1	4	Large1	191,109	56,888	29,093	76,673	0
5	Turk	Solid	SL	Mid-Atlantic	2	173	Medium1a	7,929	1,599	4,331	1,543	0
5	Turk	Solid	SL	Mid-Atlantic	2	115	Medium1b	12,220	1,563	7,131	1,493	0
5	Turk	Solid	SL	Mid-Atlantic	2	76	Medium2	17,116	1,790	9,830	1,811	0
5	Turk	Solid	SL	Mid-Atlantic	2	54	Large1	35,423	2,699	19,871	3,082	0
5	Turk	Solid	SL	Midwest	2	148	Medium1a	18,342	1,603	2,287	1,392	0
5	Turk	Solid	SL	Midwest	2	99	Medium1b	29,921	1,567	3,152	1,347	0
5	Turk	Solid	SL	Midwest	2	68	Medium2	44,064	1,795	4,303	1,632	0
5	Turk	Solid	SL	Midwest	2	74	Large1	150,389	2,727	13,404	3,036	0
5	Turk	Solid	SL	Mid-Atlantic	3	74	Medium1a	6,637	580	1,297	0	0
5	Turk	Solid	SL	Mid-Atlantic	3	49	Medium1b	10,955	580	1,562	0	0
5	Turk	Solid	SL	Mid-Atlantic	3	35	Medium2	15,679	580	1,742	0	0
5	Turk	Solid	SL	Mid-Atlantic	3	36	Large1	33,290	580	2,442	0	0
5	Turk	Solid	SL	Midwest	3	64	Medium1a	17,240	580	861	0	0
5	Turk	Solid	SL	Midwest	3	42	Medium1b	28,845	580	976	0	0
5	Turk	Solid	SL	Midwest	3	31	Medium2	42,817	580	1,146	0	0
5	Turk	Solid	SL	Midwest	3	50	Large1	148,300	580	3,058	0	0
5a	Turk	Solid	SL	Mid-Atlantic	1	12	Medium1a	7,842	1,483	1,755	1,380	0

Cost for Turkey Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yrrec	5yrrec
5a	Turk	Solid	SL	Mid-Atlantic	1	8	Medium1b	12,627	2,103	2,307	2,248	0
5a	Turk	Solid	SL	Mid-Atlantic	1	3	Medium2	17,863	2,781	2,802	3,197	0
5a	Turk	Solid	SL	Mid-Atlantic	1	2	Large1	37,378	5,266	4,674	6,676	0
5a	Turk	Solid	SL	Midwest	1	10	Medium1a	18,125	1,314	1,224	1,032	0
5a	Turk	Solid	SL	Midwest	1	7	Medium1b	30,109	1,818	1,572	1,660	0
5a	Turk	Solid	SL	Midwest	1	3	Medium2	44,537	2,424	2,022	2,416	0
5a	Turk	Solid	SL	Midwest	1	3	Large1	153,603	7,003	6,060	8,850	0
5a	Turk	Solid	SL	Mid-Atlantic	2	115	Medium1a	7,780	1,401	1,762	1,266	0
5a	Turk	Solid	SL	Mid-Atlantic	2	77	Medium1b	12,098	1,401	2,416	1,266	0
5a	Turk	Solid	SL	Mid-Atlantic	2	51	Medium2	16,986	1,619	2,986	1,571	0
5a	Turk	Solid	SL	Mid-Atlantic	2	36	Large1	35,073	2,239	5,167	2,439	0
5a	Turk	Solid	SL	Midwest	2	99	Medium1a	18,215	1,434	1,280	1,182	0
5a	Turk	Solid	SL	Midwest	2	66	Medium1b	29,798	1,404	1,748	1,145	0
5a	Turk	Solid	SL	Midwest	2	45	Medium2	43,935	1,623	2,367	1,418	0
5a	Turk	Solid	SL	Midwest	2	50	Large1	150,038	2,261	8,147	2,403	0
5a	Turk	Solid	SL	Mid-Atlantic	3	49	Medium1a	6,637	580	1,297	0	0
5a	Turk	Solid	SL	Mid-Atlantic	3	33	Medium1b	10,955	580	1,562	0	0
5a	Turk	Solid	SL	Mid-Atlantic	3	24	Medium2	15,679	580	1,742	0	0
5a	Turk	Solid	SL	Mid-Atlantic	3	24	Large1	33,290	580	2,442	0	0
5a	Turk	Solid	SL	Midwest	3	42	Medium1a	17,240	580	861	0	0
5a	Turk	Solid	SL	Midwest	3	28	Medium1b	28,845	580	976	0	0
5a	Turk	Solid	SL	Midwest	3	21	Medium2	42,817	580	1,146	0	0
5a	Turk	Solid	SL	Midwest	3	33	Large1	148,300	580	3,058	0	0
5a	Turk	Solid	SL	Mid-Atlantic	1	18	Medium1a	11,037	5,716	3,718	7,306	0
5a	Turk	Solid	SL	Mid-Atlantic	1	12	Medium1b	18,016	9,242	5,617	12,243	0
5a	Turk	Solid	SL	Mid-Atlantic	1	5	Medium2	25,653	13,100	7,586	17,644	0
5a	Turk	Solid	SL	Mid-Atlantic	1	3	Large1	54,117	27,239	14,953	37,438	0
5a	Turk	Solid	SL	Midwest	1	16	Medium1a	22,410	7,013	3,856	8,137	0
5a	Turk	Solid	SL	Midwest	1	10	Medium1b	37,336	11,429	6,010	13,644	0

Cost for Turkey Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yrrec	5yrrec
5a	Turk	Solid	SL	Midwest	1	4	Medium2	55,305	16,747	8,635	20,273	0
5a	Turk	Solid	SL	Midwest	1	4	Large1	191,109	56,888	29,093	76,673	0
5a	Turk	Solid	SL	Mid-Atlantic	2	173	Medium1a	7,929	1,599	4,331	1,543	0
5a	Turk	Solid	SL	Mid-Atlantic	2	115	Medium1b	12,220	1,563	7,131	1,493	0
5a	Turk	Solid	SL	Mid-Atlantic	2	76	Medium2	17,116	1,790	9,830	1,811	0
5a	Turk	Solid	SL	Mid-Atlantic	2	54	Large1	35,423	2,699	19,871	3,082	0
5a	Turk	Solid	SL	Midwest	2	148	Medium1a	18,342	1,603	2,287	1,392	0
5a	Turk	Solid	SL	Midwest	2	99	Medium1b	29,921	1,567	3,152	1,347	0
5a	Turk	Solid	SL	Midwest	2	68	Medium2	44,064	1,795	4,303	1,632	0
5a	Turk	Solid	SL	Midwest	2	74	Large1	150,389	2,727	13,404	3,036	0
5a	Turk	Solid	SL	Mid-Atlantic	3	74	Medium1a	6,637	580	1,297	0	0
5a	Turk	Solid	SL	Mid-Atlantic	3	49	Medium1b	10,955	580	1,562	0	0
5a	Turk	Solid	SL	Mid-Atlantic	3	35	Medium2	15,679	580	1,742	0	0
5a	Turk	Solid	SL	Mid-Atlantic	3	36	Large1	33,290	580	2,442	0	0
5a	Turk	Solid	SL	Midwest	3	64	Medium1a	17,240	580	861	0	0
5a	Turk	Solid	SL	Midwest	3	42	Medium1b	28,845	580	976	0	0
5a	Turk	Solid	SL	Midwest	3	31	Medium2	42,817	580	1,146	0	0
5a	Turk	Solid	SL	Midwest	3	50	Large1	148,300	580	3,058	0	0
7	Turk	Solid	SL	Mid-Atlantic	1	12	Medium1a	7,842	1,483	1,755	1,380	0
7	Turk	Solid	SL	Mid-Atlantic	1	8	Medium1b	12,627	2,103	2,307	2,248	0
7	Turk	Solid	SL	Mid-Atlantic	1	3	Medium2	17,863	2,781	2,802	3,197	0
7	Turk	Solid	SL	Mid-Atlantic	1	2	Large1	37,378	5,266	4,674	6,676	0
7	Turk	Solid	SL	Midwest	1	10	Medium1a	18,125	1,314	1,224	1,032	0
7	Turk	Solid	SL	Midwest	1	7	Medium1b	30,109	1,818	1,572	1,660	0
7	Turk	Solid	SL	Midwest	1	3	Medium2	44,537	2,424	2,022	2,416	0
7	Turk	Solid	SL	Midwest	1	3	Large1	153,603	7,003	6,060	8,850	0
7	Turk	Solid	SL	Mid-Atlantic	2	115	Medium1a	7,780	1,401	1,762	1,266	0
7	Turk	Solid	SL	Mid-Atlantic	2	77	Medium1b	12,098	1,401	2,416	1,266	0
7	Turk	Solid	SL	Mid-Atlantic	2	51	Medium2	16,986	1,619	2,986	1,571	0

Cost for Turkey Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yrrec	5yrrec
7	Turk	Solid	SL	Mid-Atlantic	2	36	Large1	35,073	2,239	5,167	2,439	0
7	Turk	Solid	SL	Midwest	2	99	Medium1a	18,215	1,434	1,280	1,182	0
7	Turk	Solid	SL	Midwest	2	66	Medium1b	29,798	1,404	1,748	1,145	0
7	Turk	Solid	SL	Midwest	2	45	Medium2	43,935	1,623	2,367	1,418	0
7	Turk	Solid	SL	Midwest	2	50	Large1	150,038	2,261	8,147	2,403	0
7	Turk	Solid	SL	Mid-Atlantic	3	49	Medium1a	6,637	580	1,297	0	0
7	Turk	Solid	SL	Mid-Atlantic	3	33	Medium1b	10,955	580	1,562	0	0
7	Turk	Solid	SL	Mid-Atlantic	3	24	Medium2	15,679	580	1,742	0	0
7	Turk	Solid	SL	Mid-Atlantic	3	24	Large1	33,290	580	2,442	0	0
7	Turk	Solid	SL	Midwest	3	42	Medium1a	17,240	580	861	0	0
7	Turk	Solid	SL	Midwest	3	28	Medium1b	28,845	580	976	0	0
7	Turk	Solid	SL	Midwest	3	21	Medium2	42,817	580	1,146	0	0
7	Turk	Solid	SL	Midwest	3	33	Large1	148,300	580	3,058	0	0
7	Turk	Solid	SL	Mid-Atlantic	1	18	Medium1a	11,037	5,716	3,718	7,306	0
7	Turk	Solid	SL	Mid-Atlantic	1	12	Medium1b	18,016	9,242	5,617	12,243	0
7	Turk	Solid	SL	Mid-Atlantic	1	5	Medium2	25,653	13,100	7,586	17,644	0
7	Turk	Solid	SL	Mid-Atlantic	1	3	Large1	54,117	27,239	14,953	37,438	0
7	Turk	Solid	SL	Midwest	1	16	Medium1a	22,410	7,013	3,856	8,137	0
7	Turk	Solid	SL	Midwest	1	10	Medium1b	37,336	11,429	6,010	13,644	0
7	Turk	Solid	SL	Midwest	1	4	Medium2	55,305	16,747	8,635	20,273	0
7	Turk	Solid	SL	Midwest	1	4	Large1	191,109	56,888	29,093	76,673	0
7	Turk	Solid	SL	Mid-Atlantic	2	173	Medium1a	7,929	1,599	4,331	1,543	0
7	Turk	Solid	SL	Mid-Atlantic	2	115	Medium1b	12,220	1,563	7,131	1,493	0
7	Turk	Solid	SL	Mid-Atlantic	2	76	Medium2	17,116	1,790	9,830	1,811	0
7	Turk	Solid	SL	Mid-Atlantic	2	54	Large1	35,423	2,699	19,871	3,082	0
7	Turk	Solid	SL	Midwest	2	148	Medium1a	18,342	1,603	2,287	1,392	0
7	Turk	Solid	SL	Midwest	2	99	Medium1b	29,921	1,567	3,152	1,347	0
7	Turk	Solid	SL	Midwest	2	68	Medium2	44,064	1,795	4,303	1,632	0
7	Turk	Solid	SL	Midwest	2	74	Large1	150,389	2,727	13,404	3,036	0

Cost for Turkey Operations (Continued)

Option	Animal	Type	Operation	Region	Category	# Facilities	Size ID	Capital	Fixed	O&M	3yrrec	5yrrec
7	Turk	Solid	SL	Mid-Atlantic	3	74	Medium1a	6,637	580	1,297	0	0
7	Turk	Solid	SL	Mid-Atlantic	3	49	Medium1b	10,955	580	1,562	0	0
7	Turk	Solid	SL	Mid-Atlantic	3	35	Medium2	15,679	580	1,742	0	0
7	Turk	Solid	SL	Mid-Atlantic	3	36	Large1	33,290	580	2,442	0	0
7	Turk	Solid	SL	Midwest	3	64	Medium1a	17,240	580	861	0	0
7	Turk	Solid	SL	Midwest	3	42	Medium1b	28,845	580	976	0	0
7	Turk	Solid	SL	Midwest	3	31	Medium2	42,817	580	1,146	0	0
7	Turk	Solid	SL	Midwest	3	50	Large1	148,300	580	3,058	0	0